

Health, Transportation and Bicycling: Connecting the Dotted Lines

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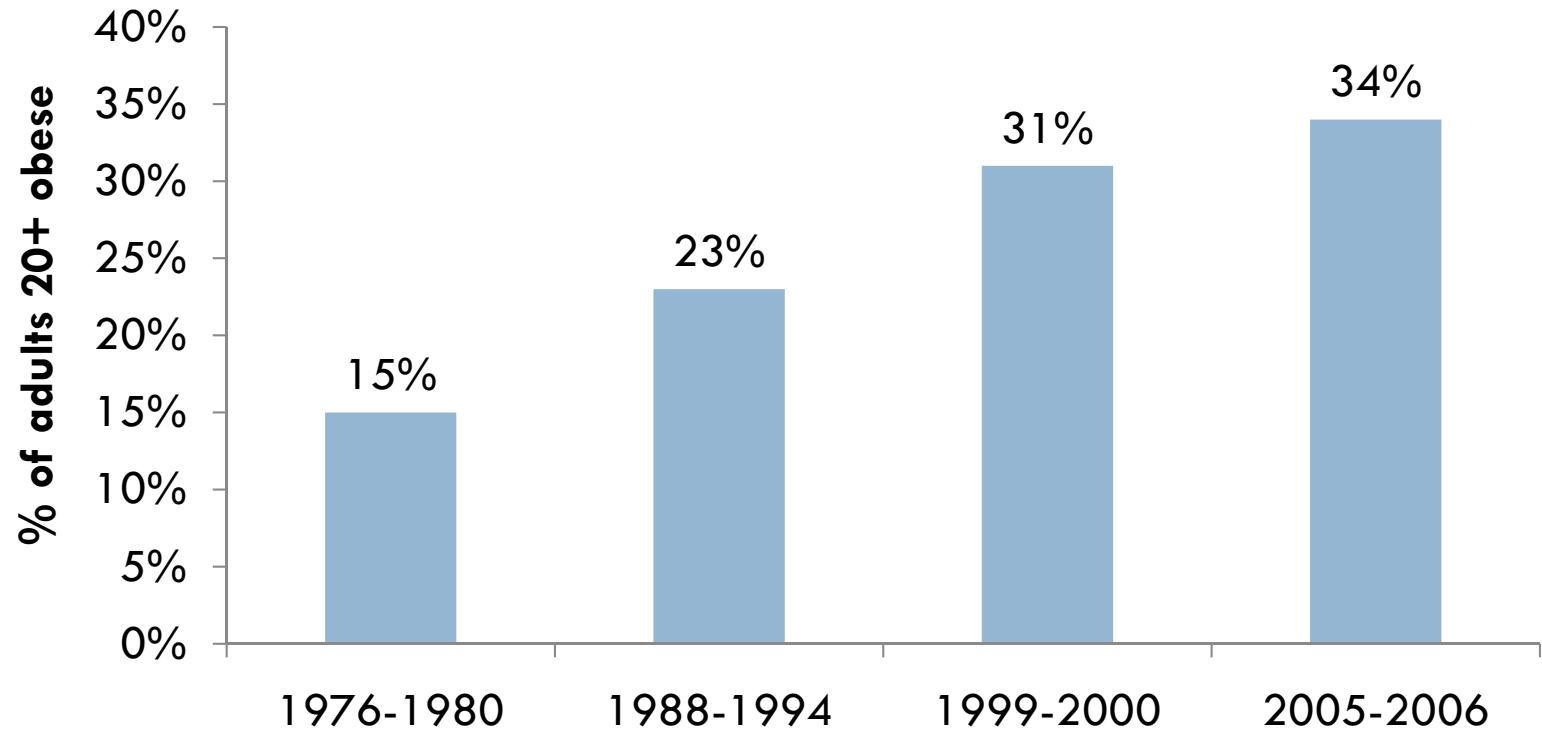
**Director, Oregon Transportation Research & Education
Consortium (OTREC)**

University of Vermont, November 17, 2010



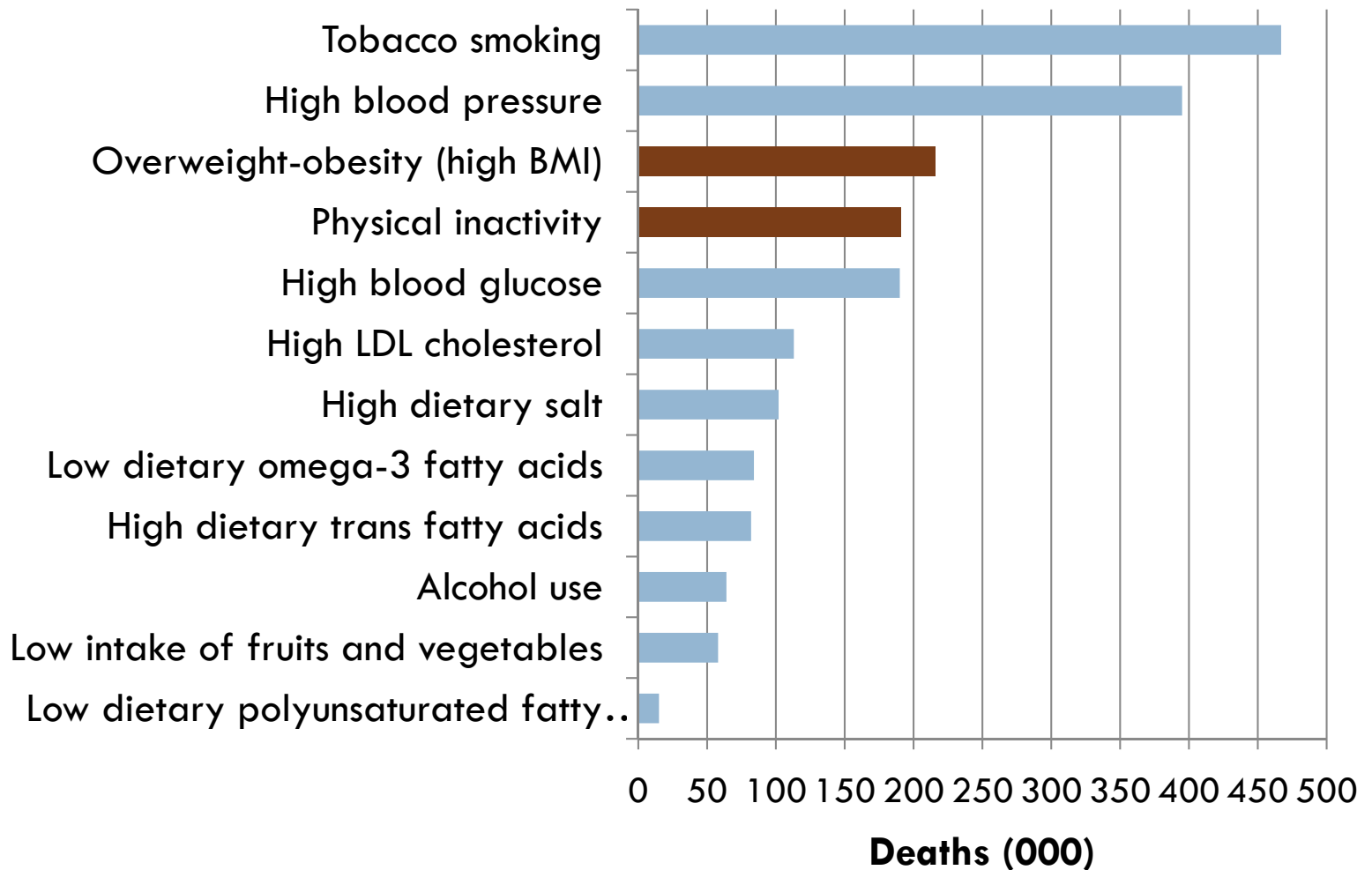
Health and Bicycling

Increasing rates of obesity

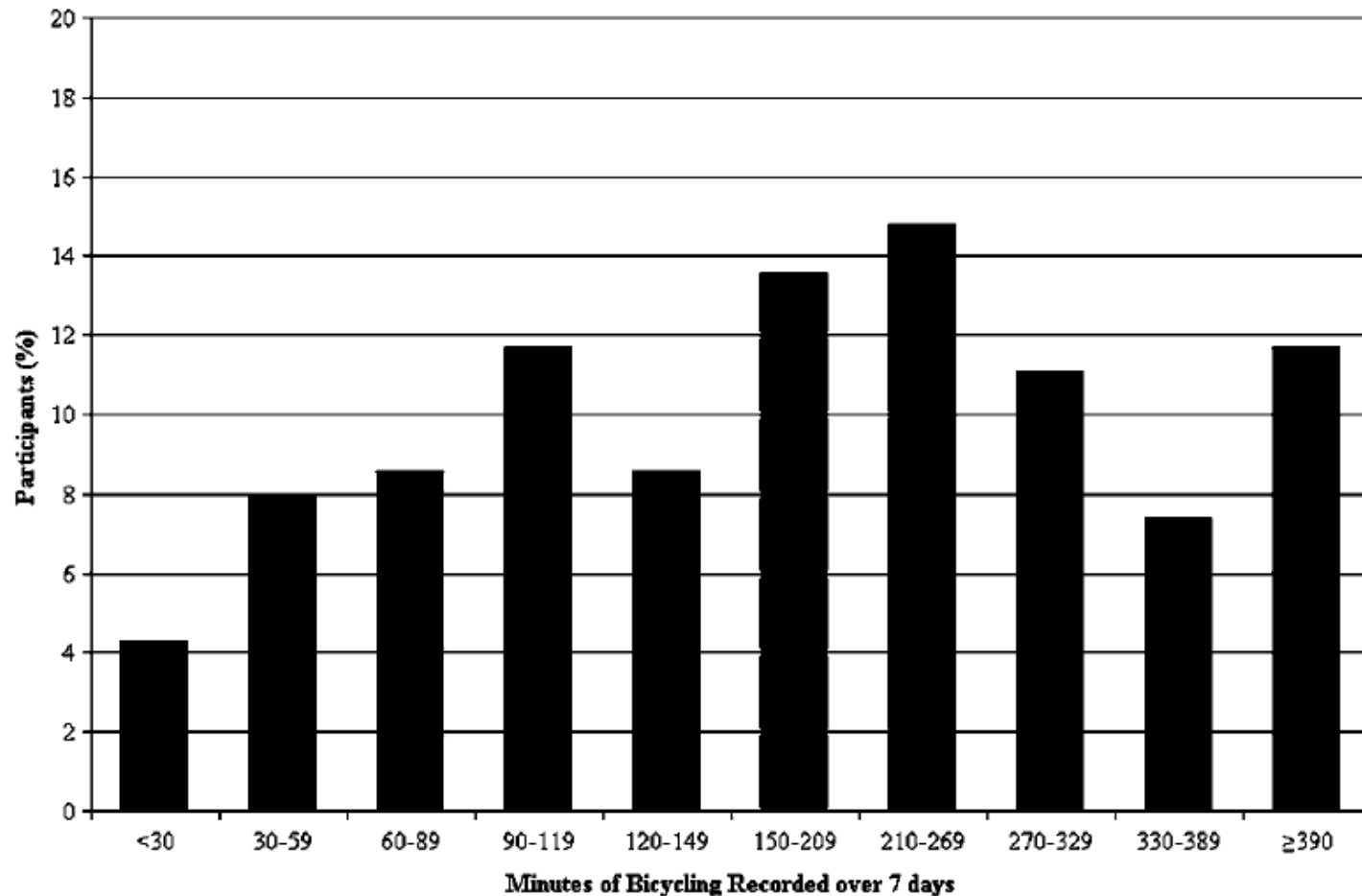


Ogden CL, Carroll MD, McDowell MA, Flegal KM. Obesity among adults in the United States— no change since 2003–2004. NCHS data brief no 1. Hyattsville, MD: National Center for Health Statistics. 2007. <http://www.cdc.gov/nchs/data/databriefs/db01.pdf>

Obesity & Inactivity ⇒ Death



Cyclists can meet PA objectives



Jennifer Dill, "Bicycling for Transportation and Health: The Role of Infrastructure," *Journal of Public Health Policy*, 30 (SI): 95-110, 2009.

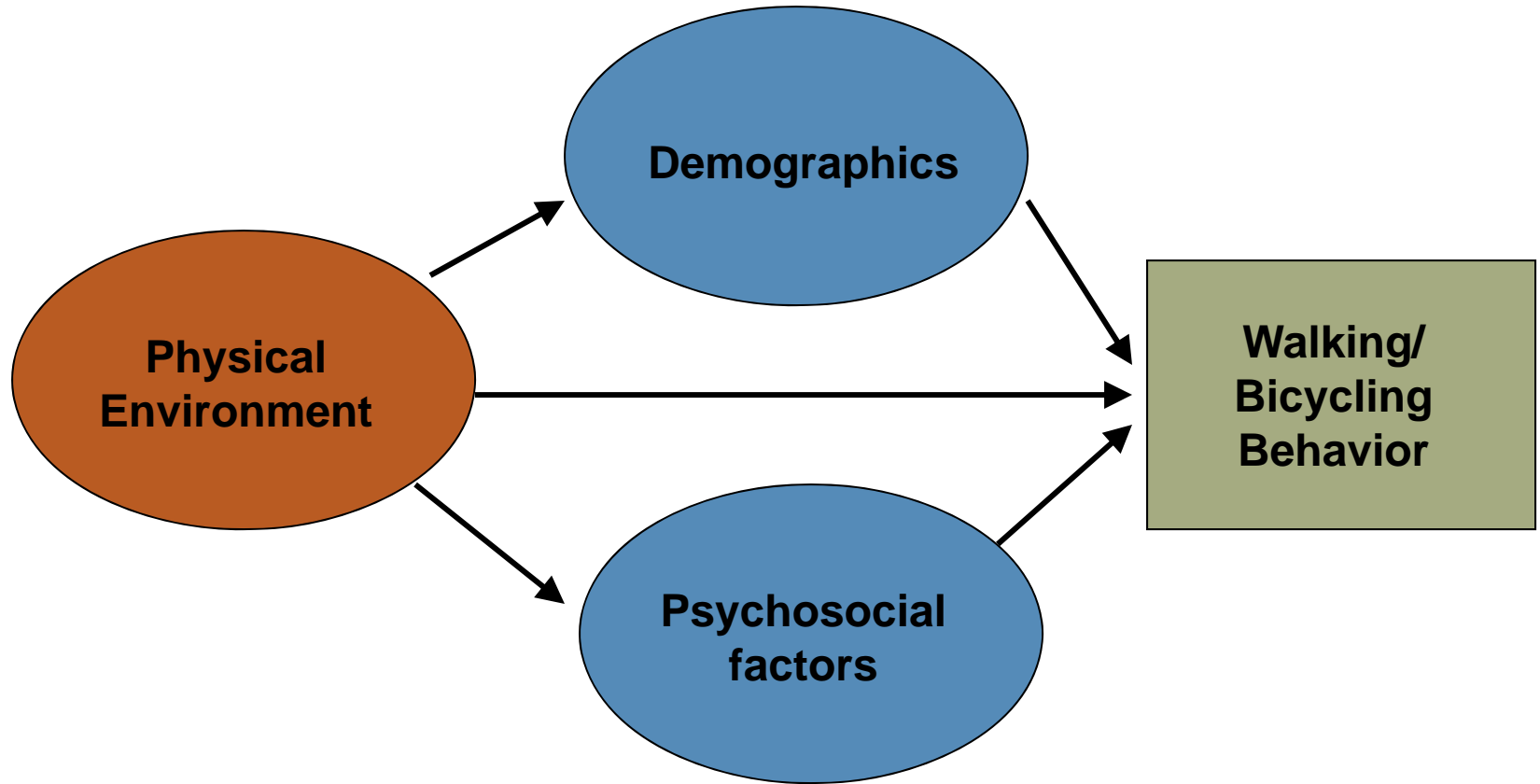
Health benefits, but also risks





How do we increase cycling?

Socio-Ecological Model



What does the research say?

Reviewed 139 studies...

Pucher, Dill, and Handy, “Infrastructure, Programs, and Policies to Increase Bicycling,” *Preventive Medicine*, Jan 2010, Vol. 50, S.1, pp. S106-S125.

What does the research say?

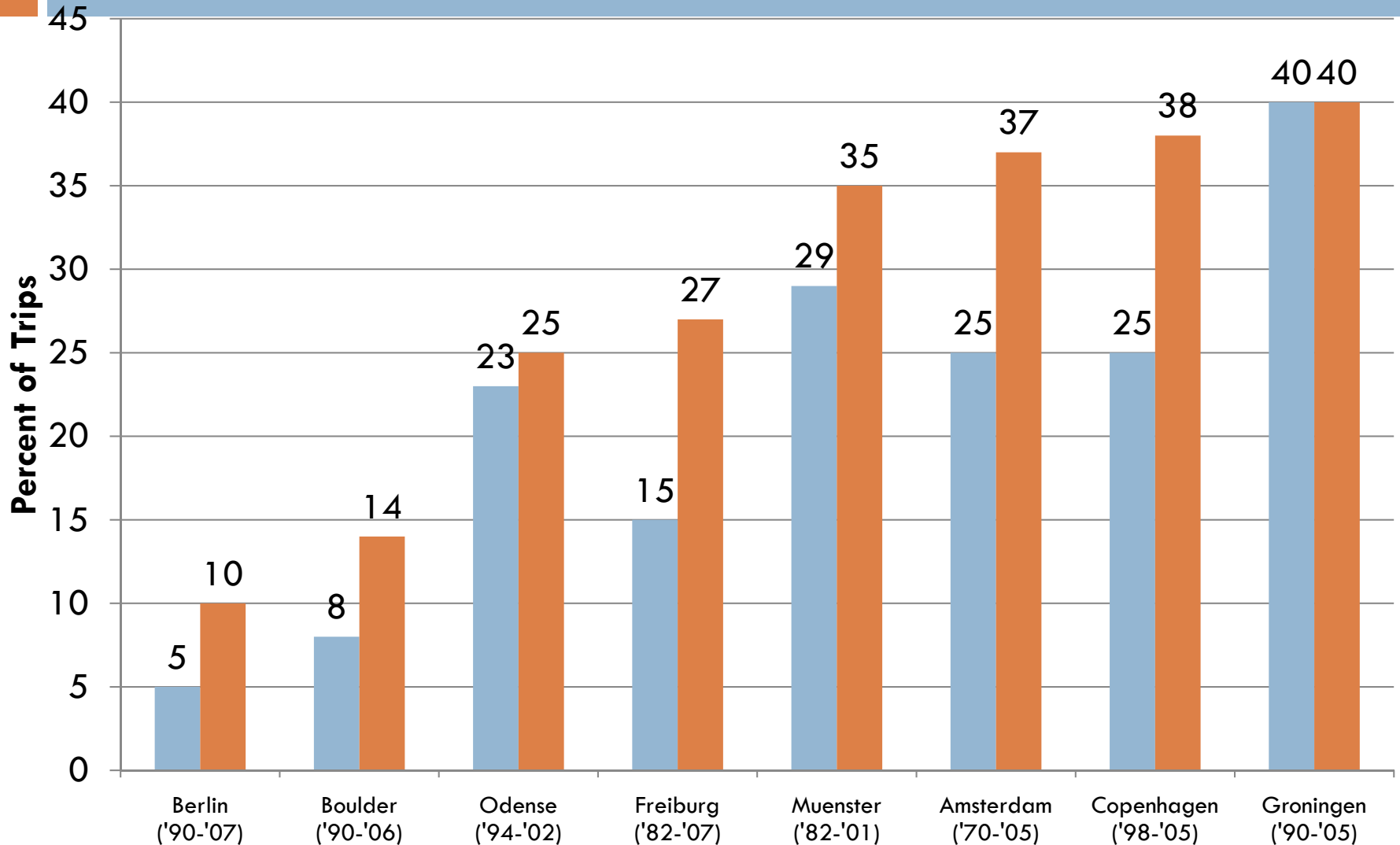
- Generally, not enough
- Several studies (but not all) found positive associations with bike lanes, paths, boulevards, cycletracks, and traffic calming
 - ▣ Effects can vary depending upon type of cyclist
- Independent effects of other infrastructure (e.g. parking, bike boxes, signage) difficult to detect
 - ▣ Likely play important supportive role, as do policies and programs

What is possible?

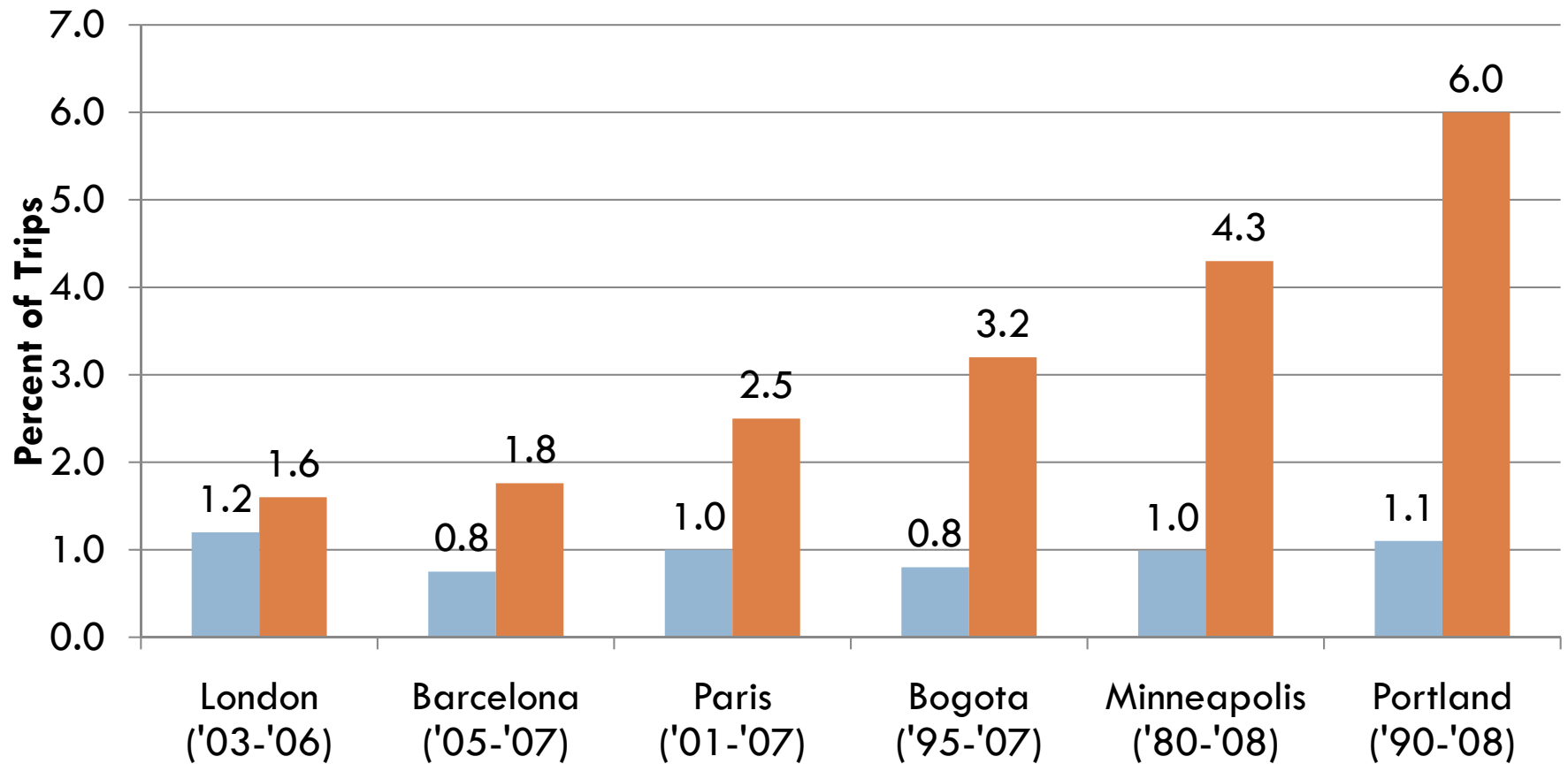
“The most compelling evidence we found came from communities that have implemented a fully integrated package of strategies to increase bicycling.”

Pucher, Dill, Handy, 2010.

Increase in Bike Share of Trips in Cities Around the World



Increase in Bike Share of Trips in Cities Around the World

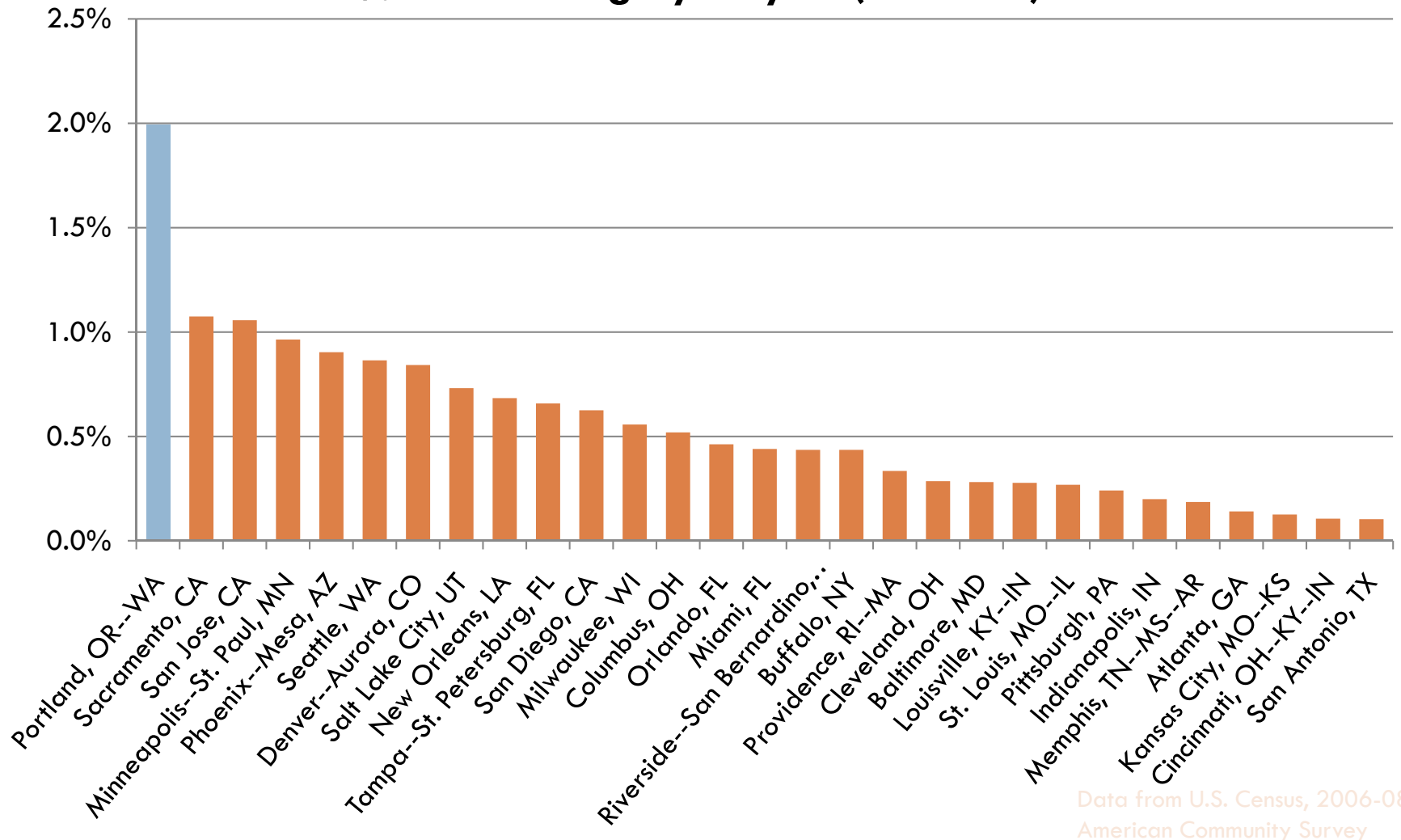




What's up with Portland?

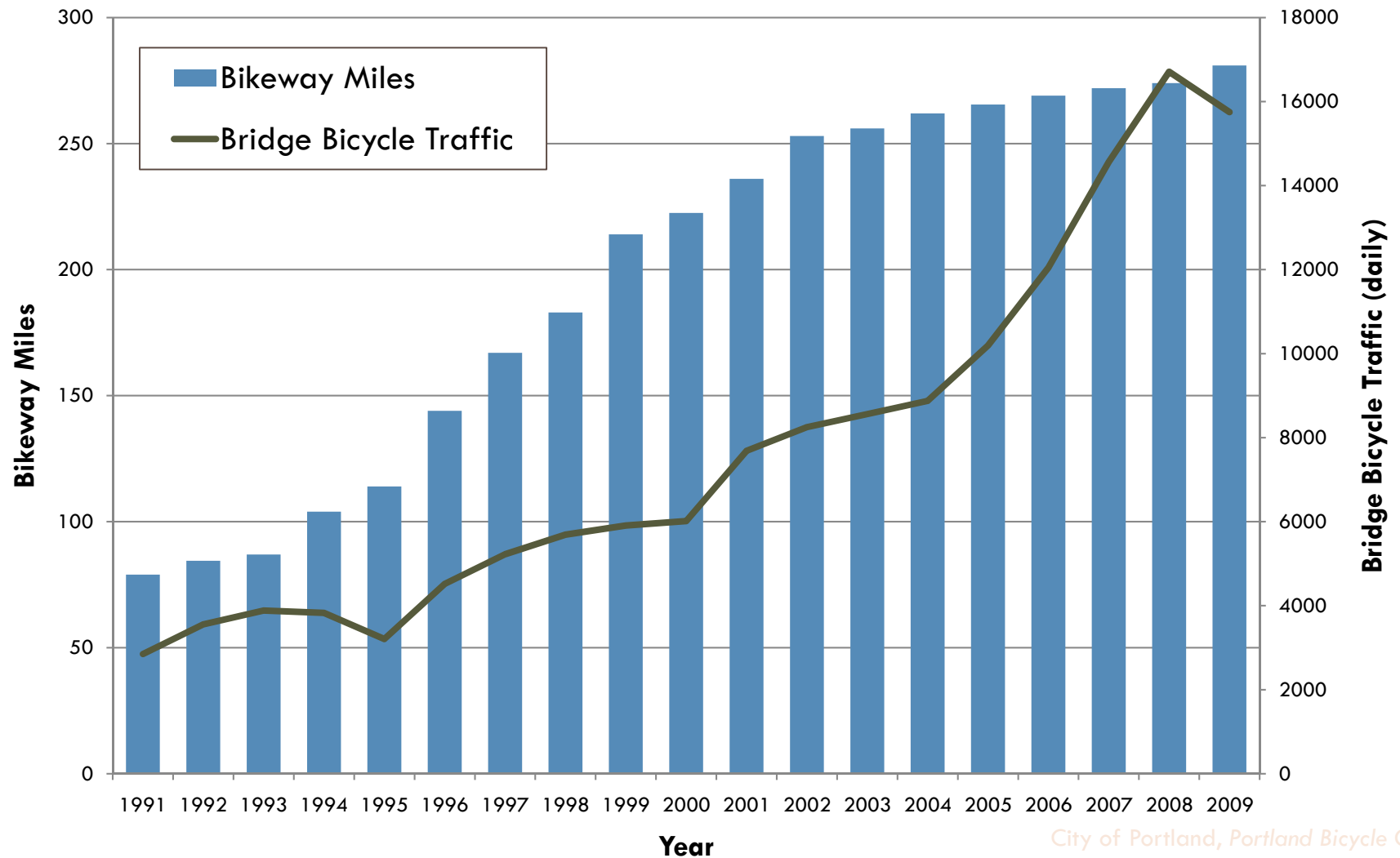
Portland vs. Other US Regions

% Commuting by Bicycle (2006-08)

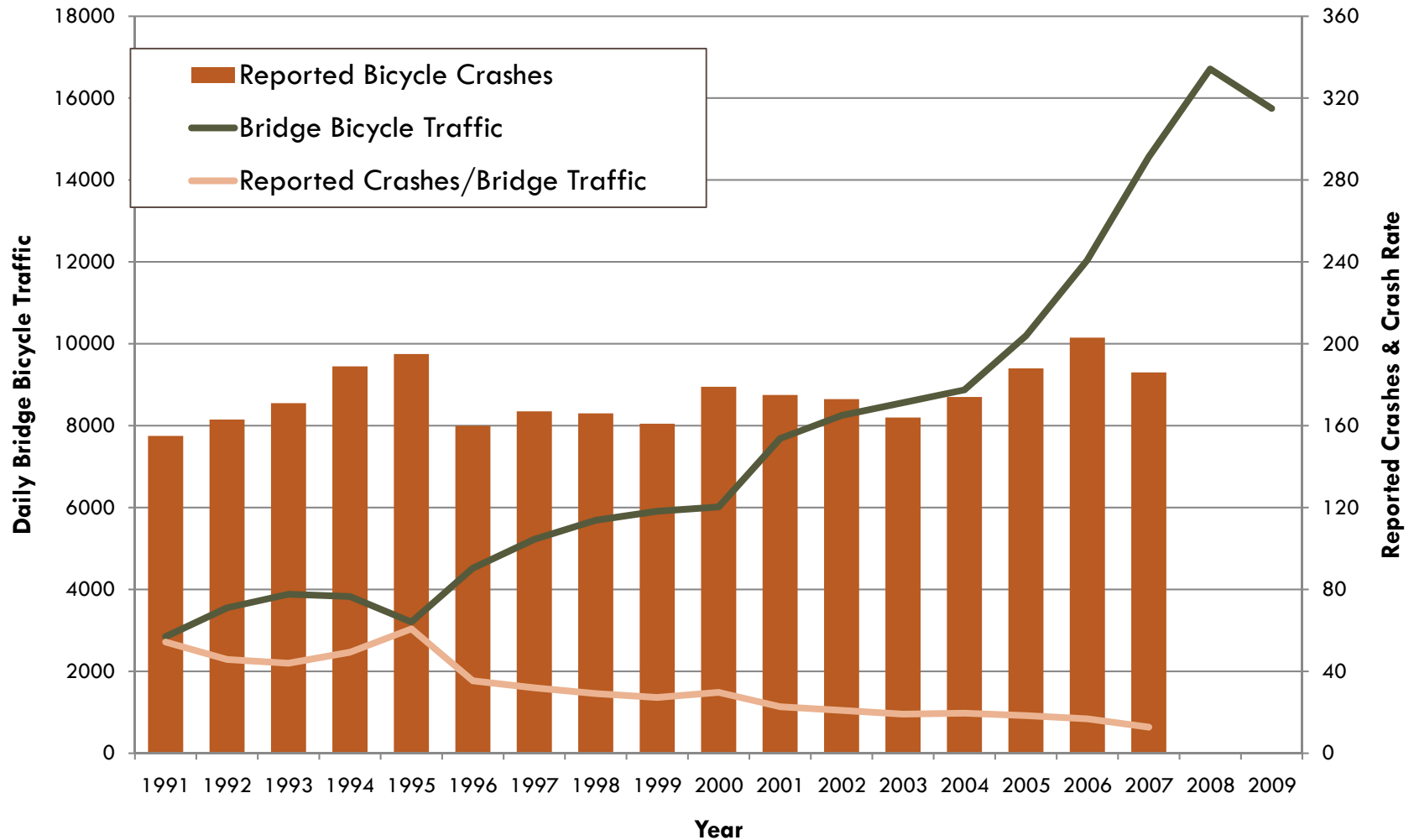


Data from U.S. Census, 2006-08
American Community Survey

Growth in Bicycling in Portland



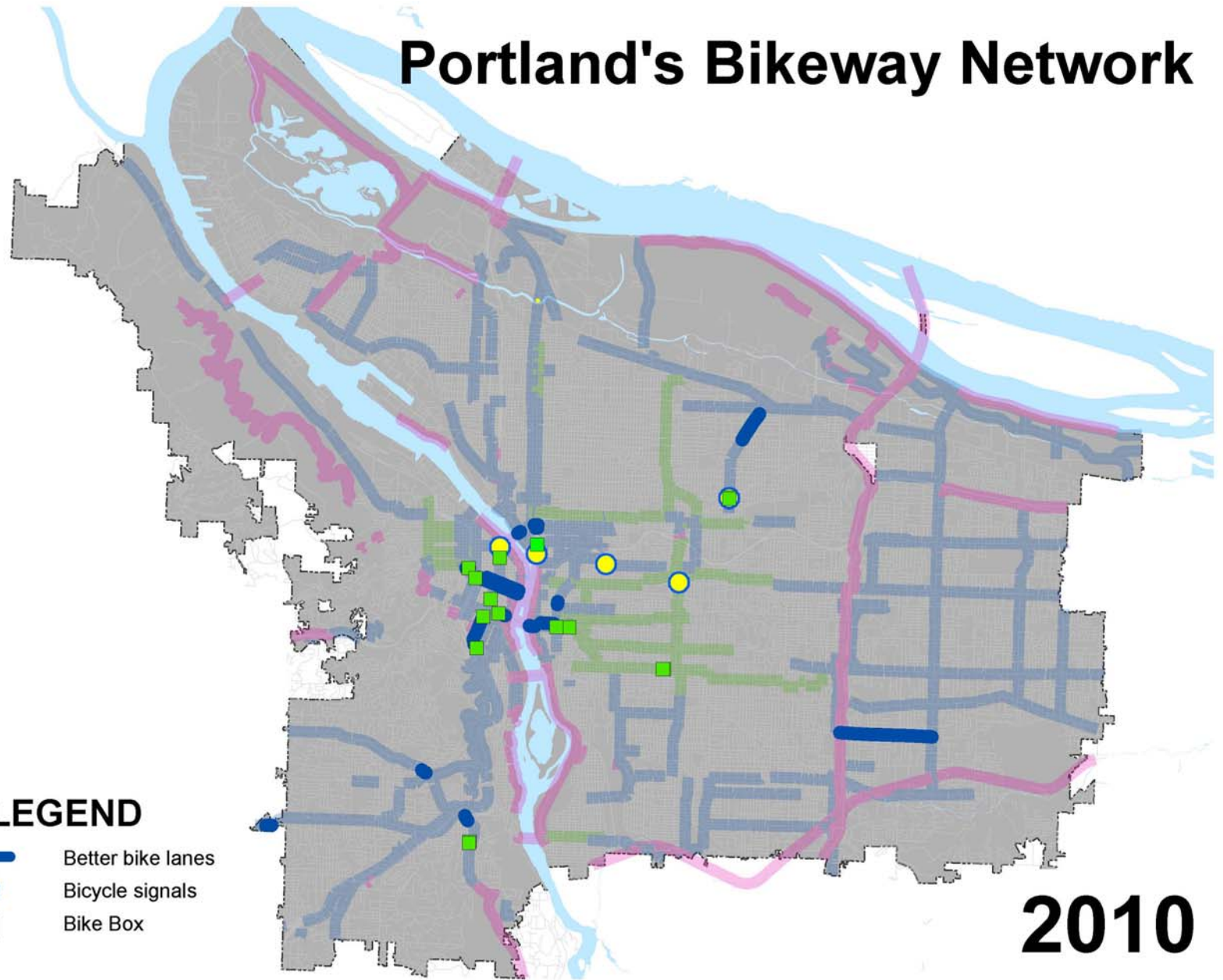
Bicycle Traffic vs. Crashes







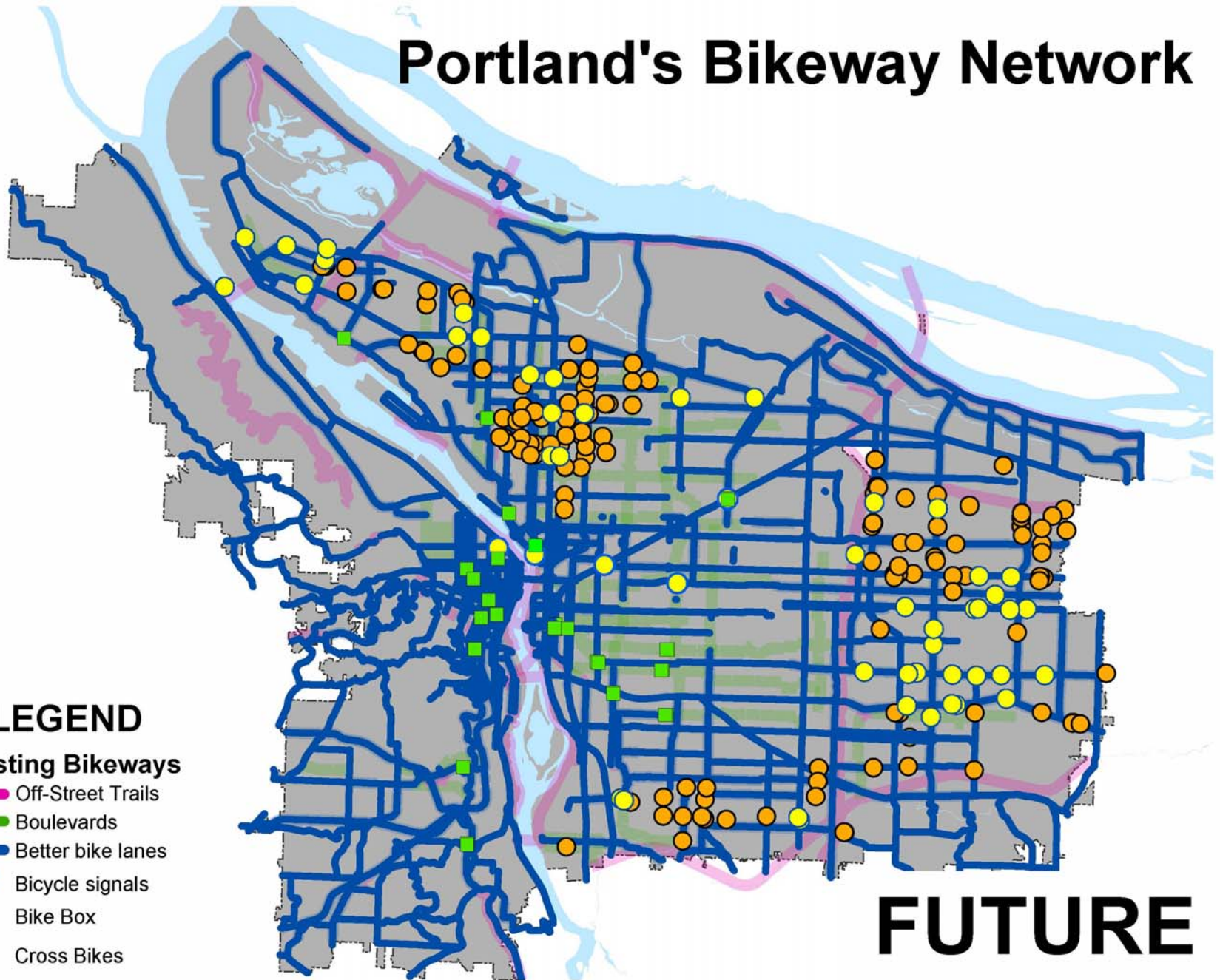
Portland's Bikeway Network



2010

Portland's Bikeway Network

- LEGEND**
- Existing Bikeways**
- Off-Street Trails
 - Boulevards
 - Better bike lanes
 - Bicycle signals
 - Bike Box
 - Cross Bikes



FUTURE

Research in Portland

The Role of...

- Traditional Network Facilities
- Innovative Infrastructure
- Psychology

BikeGPS Study

Research questions

How does the built environment influence bicycling behavior?

What routes do cyclists take?

Phases

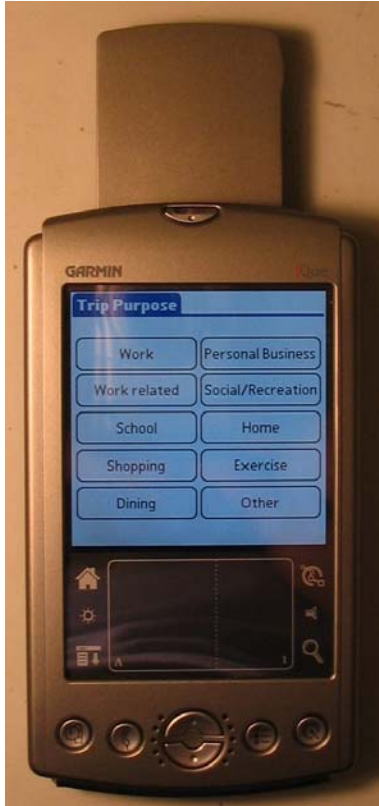
Random phone survey of Portland, OR region adults

GPS

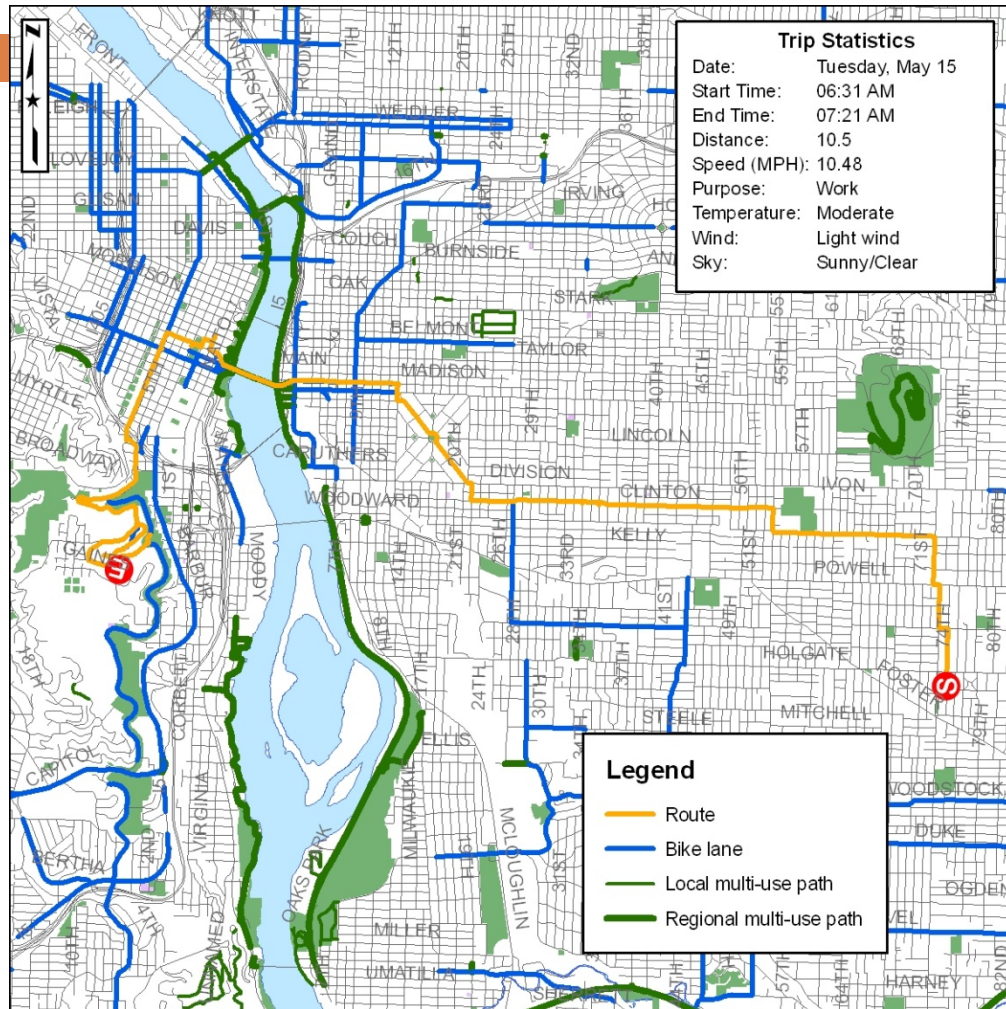
Barriers to cycling more

Do any of the following environmental barriers keep you from biking or biking more?	Of people who want to cycle more, % of category that identified this barrier		
	Non-cyclist	Recreation Only	Infrequent Utilitarian
Too much traffic	60%	65%	40%
No bike lanes or bike trails	33%	47%	28%
No safe places to bike nearby	33%	38%	18%
Too many hills	28%	36%	32%
Distances to places are too great	26%	29%	27%
Poorly maintained streets or rough surfaces	27%	20%	10%
No interesting places to bike to	26%	20%	14%
n (weighted)	168	81	90

GPS data collection

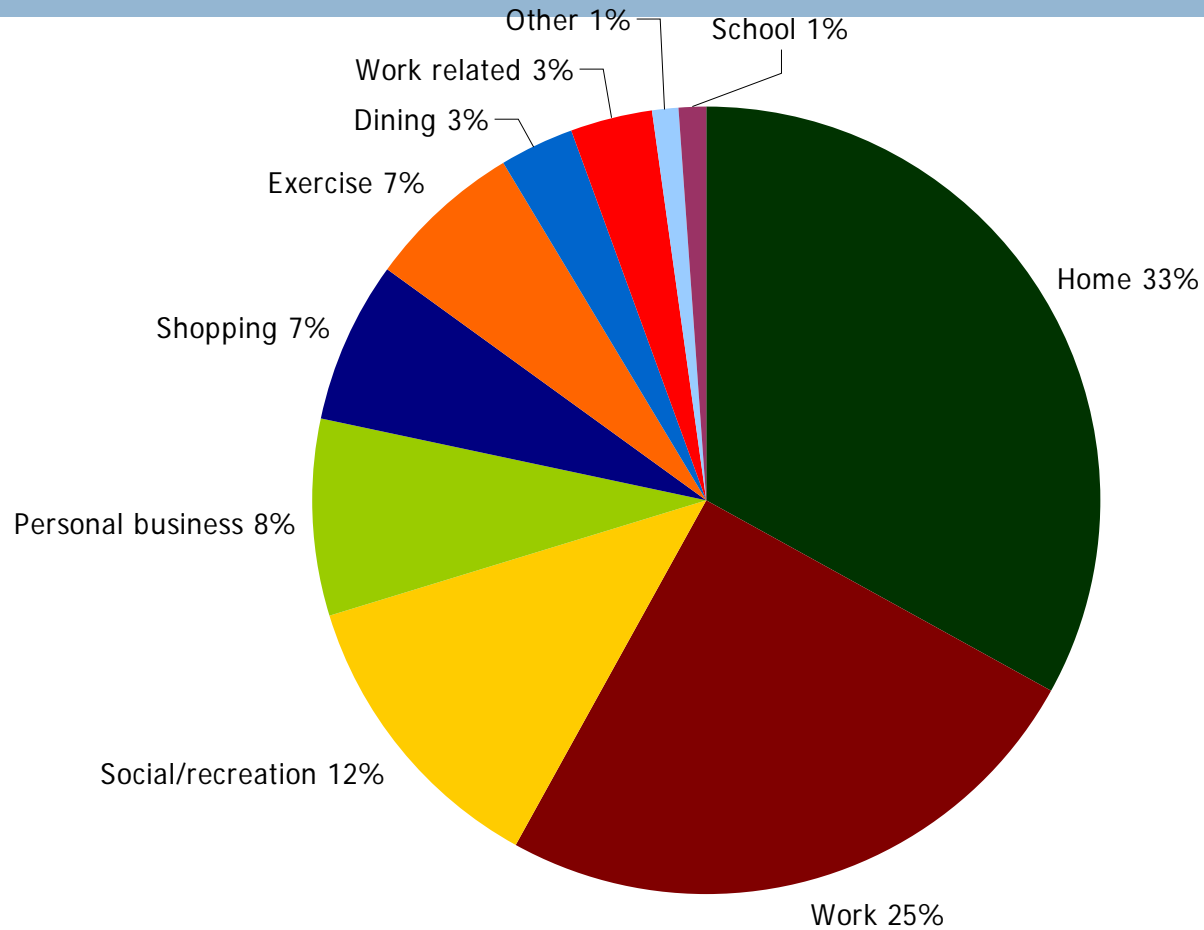


- 164 people in 2007
 - ▣ Keep GPS for 7 days
 - ▣ Take on all bike trips (a few exceptions)
 - ▣ Not representative sample of the population
- Participant entered some data
 - ▣ Trip purpose and weather
 - ▣ If taking bike on transit



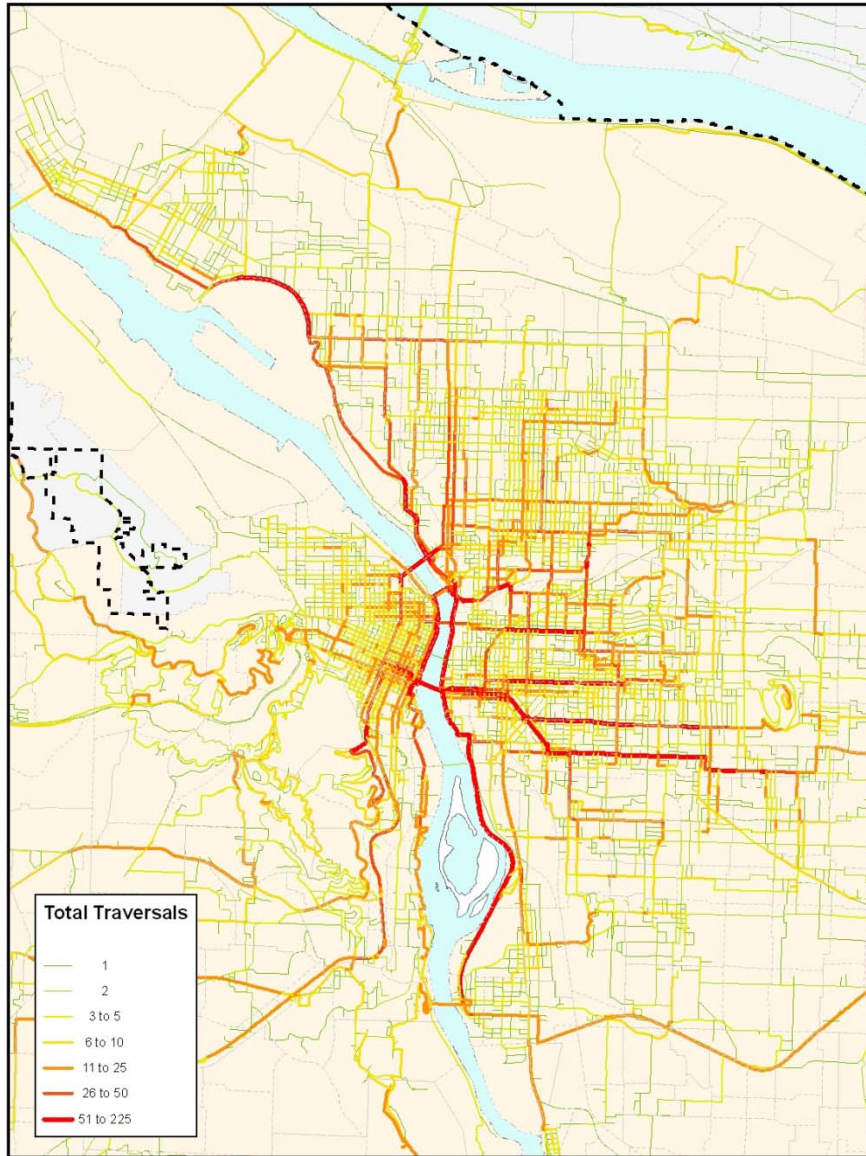
- Follow up on-line survey
 - Accuracy of route
 - Route choice decisions
 - Missing data

Trip destinations

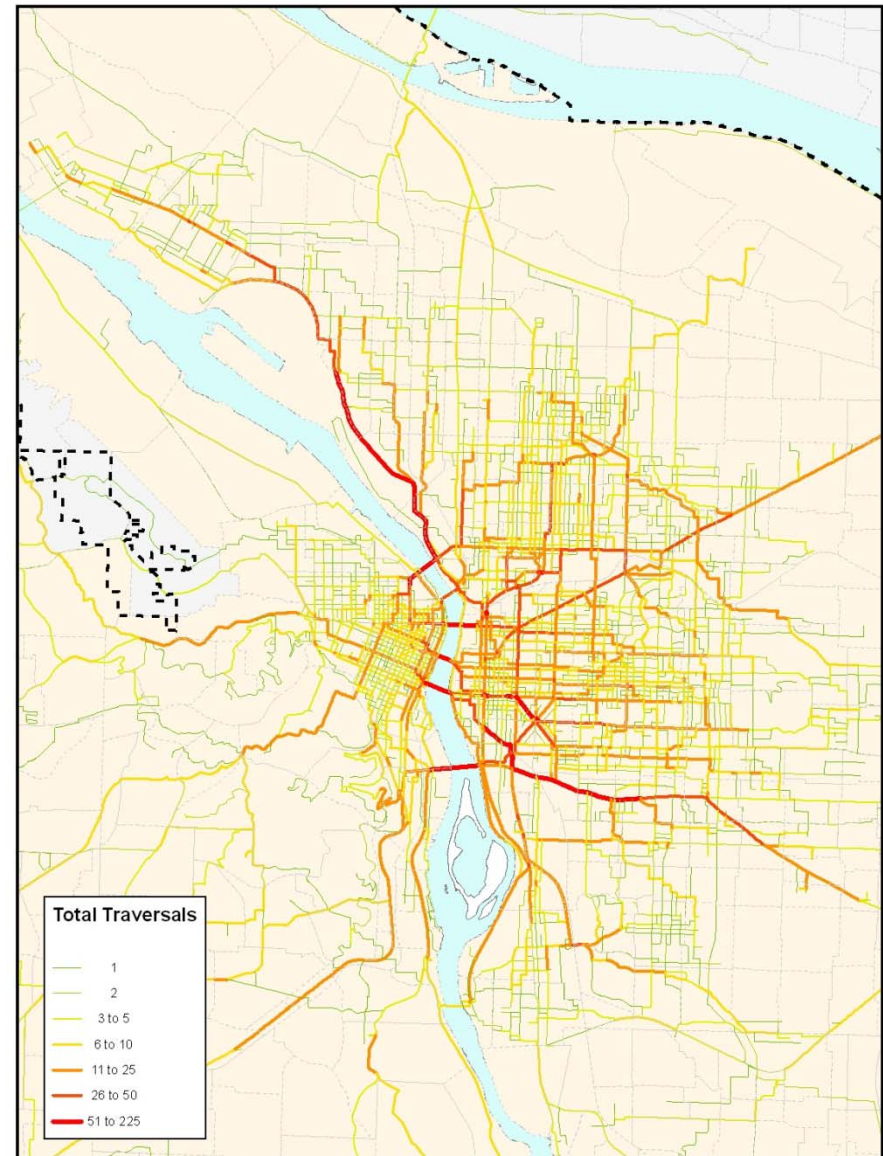


Excludes trips involving transit

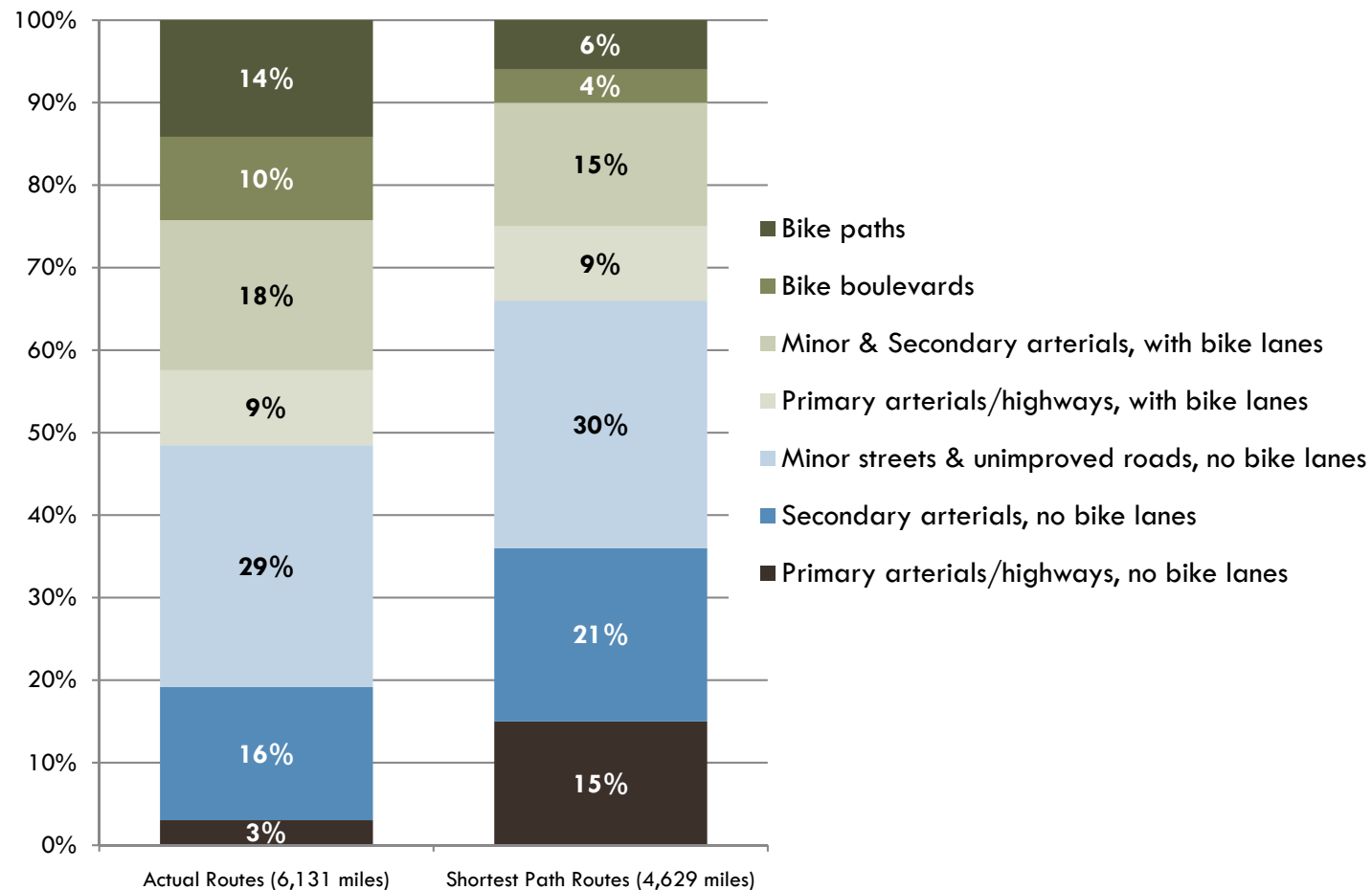
Actual Trips



Shortest Paths

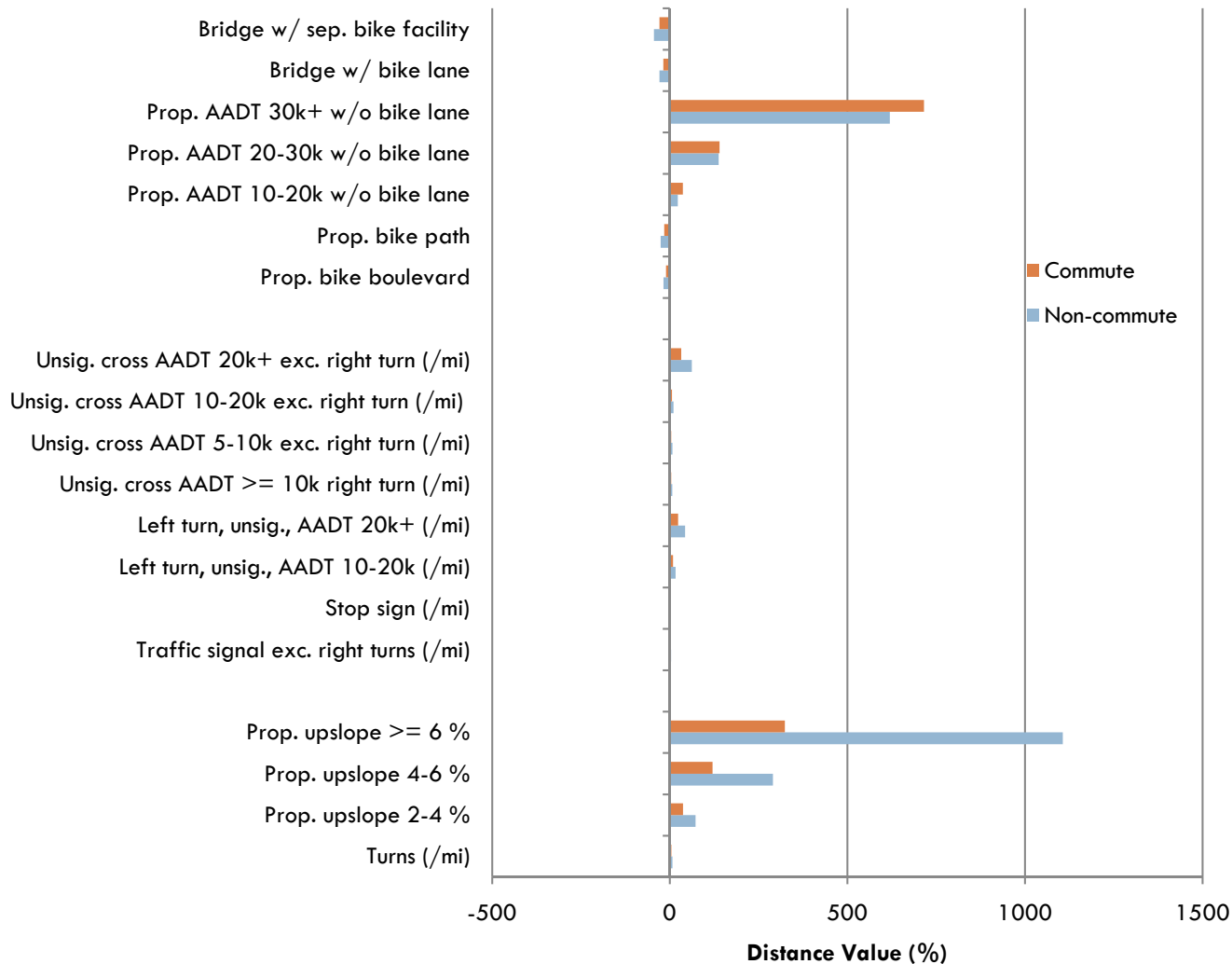


Cyclists are going longer distances to use bicycle infrastructure



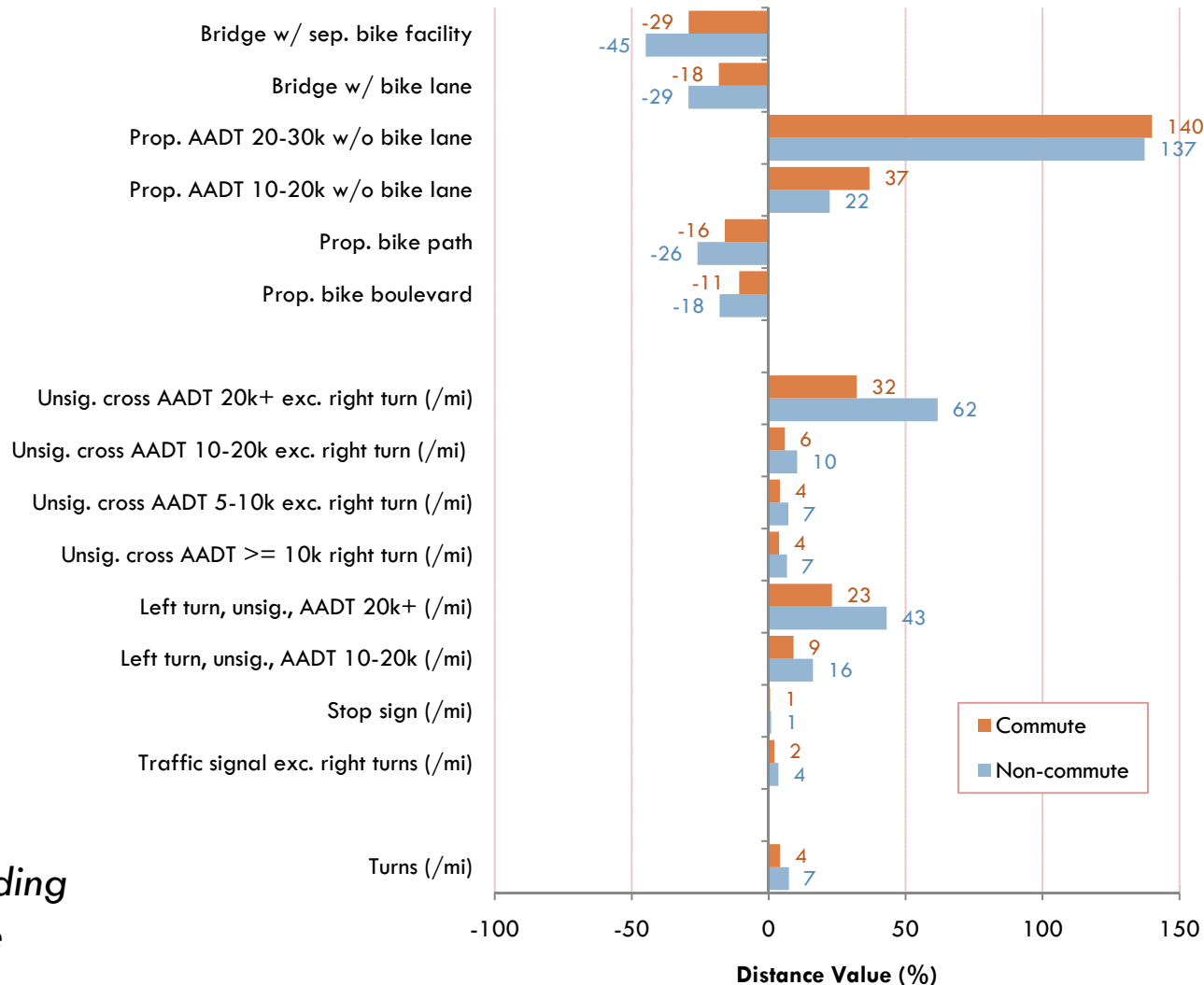
Excludes trips involving transit, trips with the main purpose of exercise, organized rides, and trips starting and ending at the same place

The Relative Value of Facilities



*Relative to riding
in a bike lane*

The Relative Value of Facilities





Innovative Infrastructure

Evaluation of Bike Boxes at Signalized Intersections

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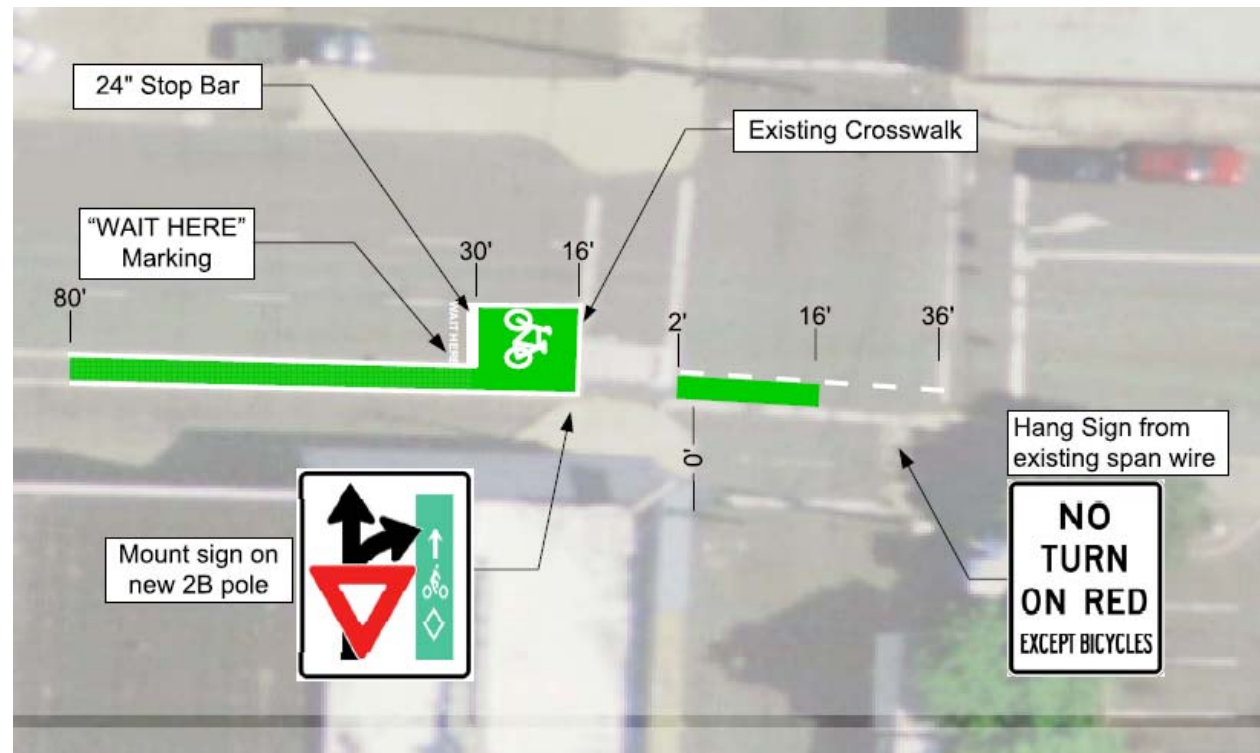
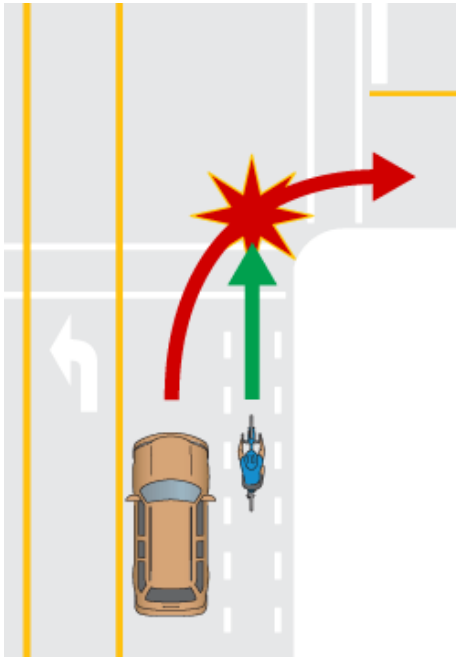


Portland State
UNIVERSITY



Why Bike Boxes?

Right Hook Collision

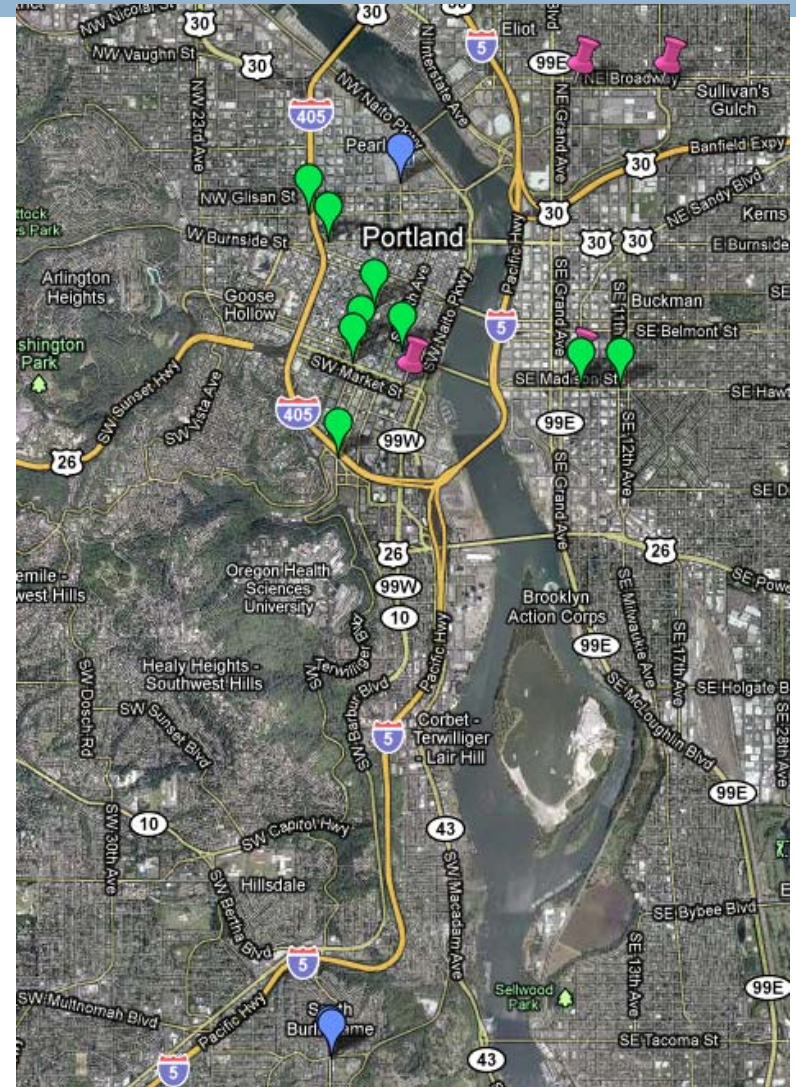


Bike Boxes in Portland

9 - Green Bike Boxes



3 - Uncolored Bike Boxes

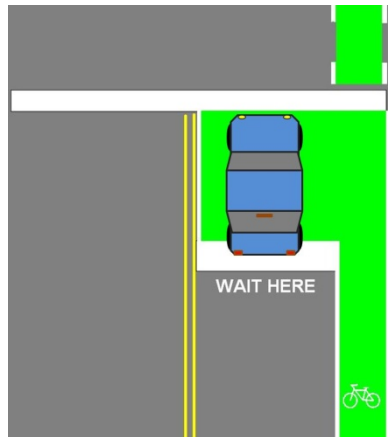


Do Users Understand the Markings?

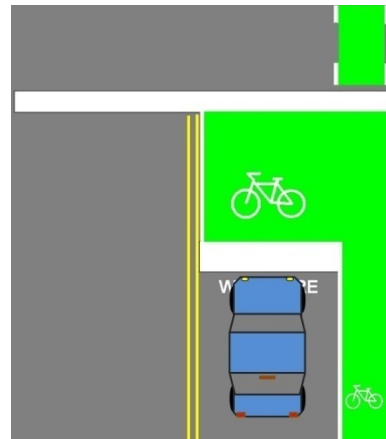


Motorist Survey

If you approached an intersection with a red light where should you stop your car?

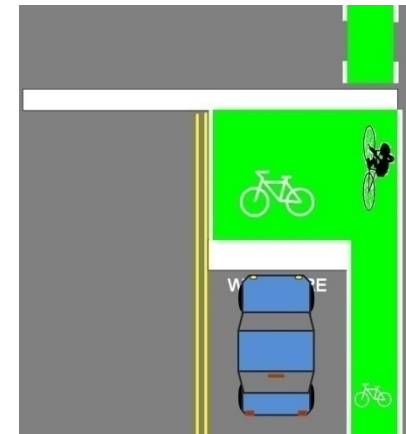
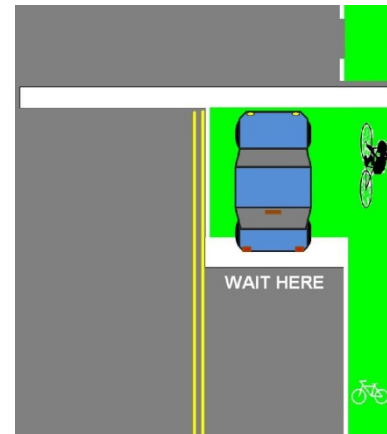


2% in box
1% either
3% don't know



94%

9% in box
<1% either
1% don't know



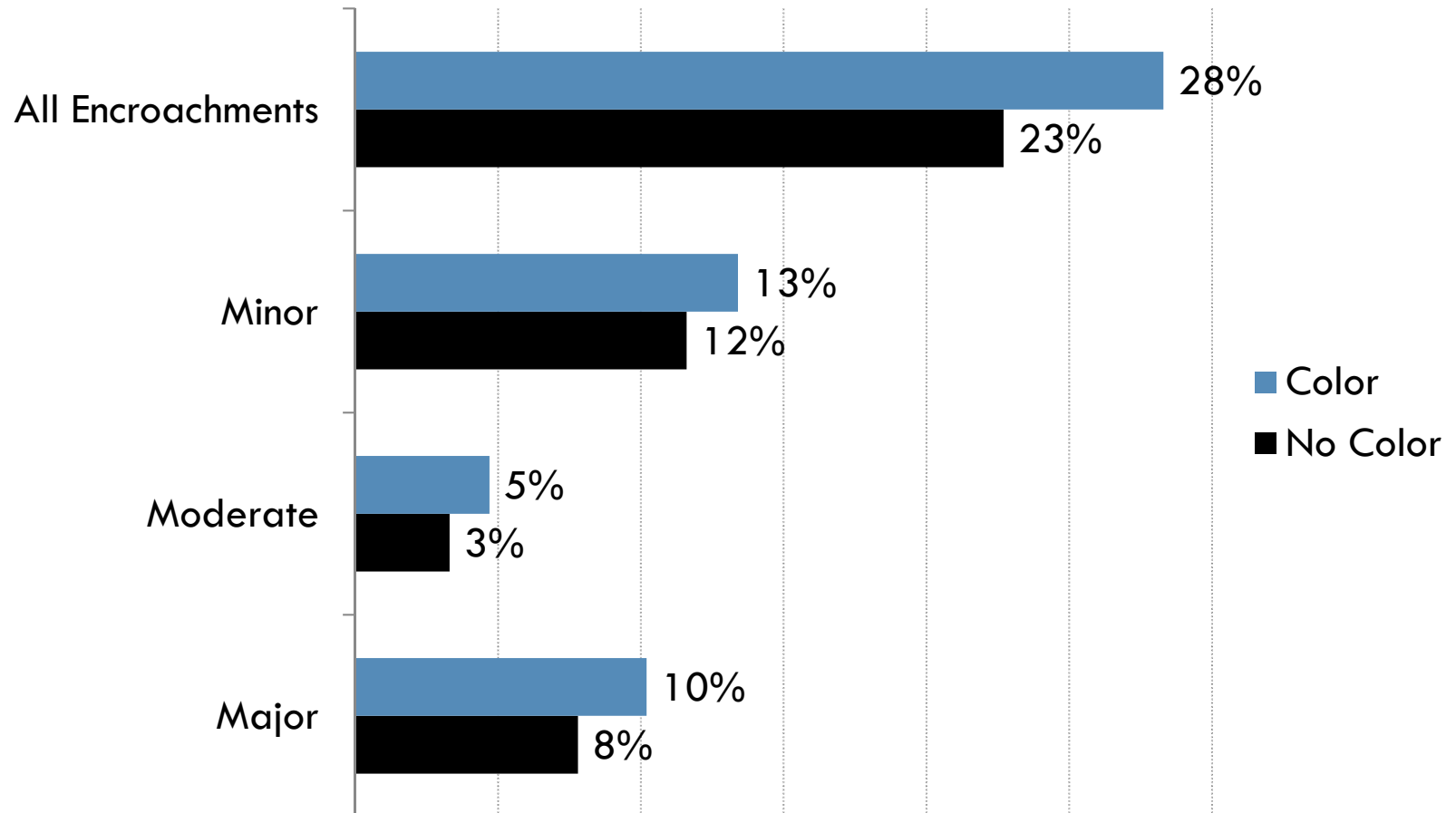
89%

Do Users Behave as Intended?

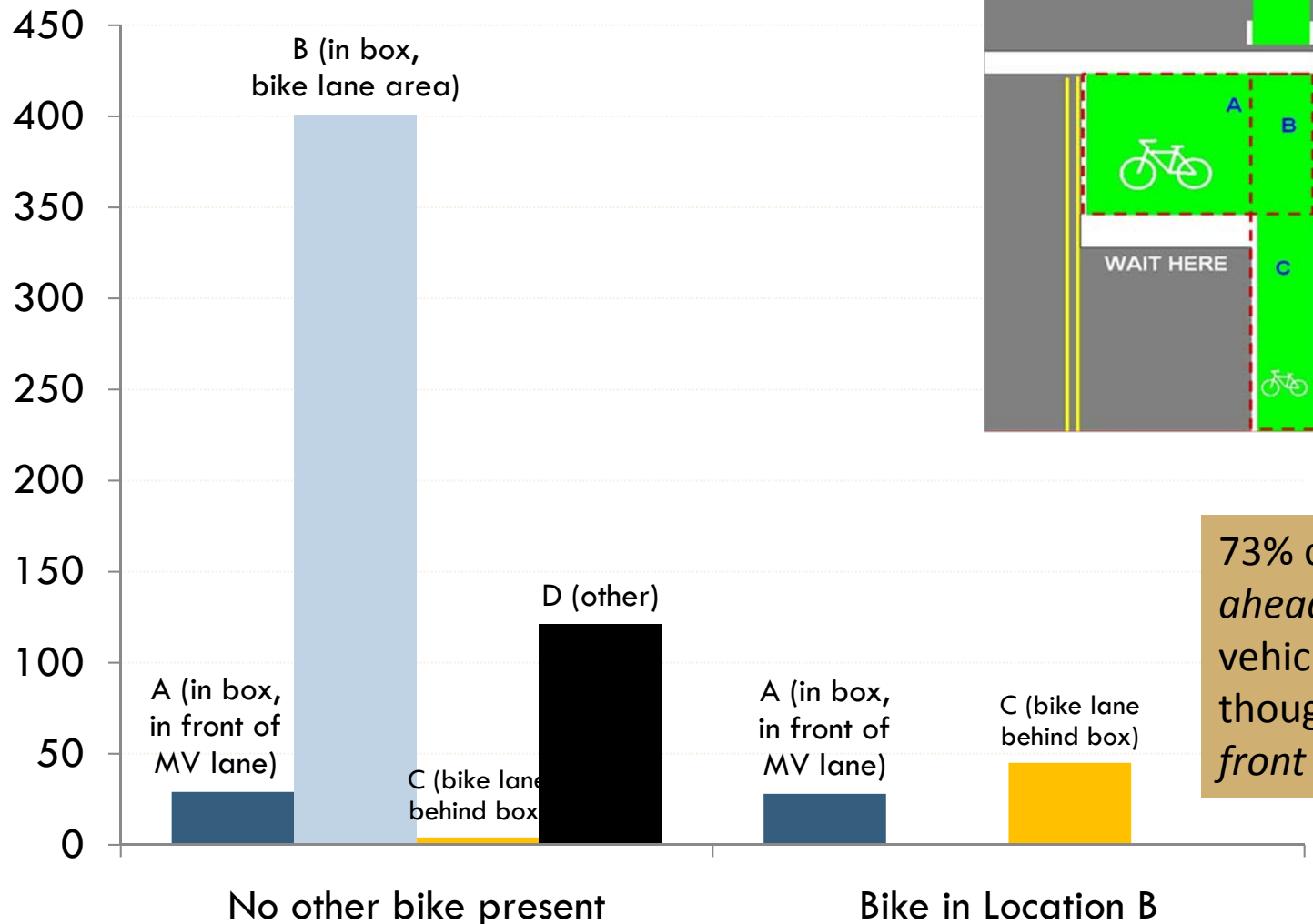


Motorist Encroachment in the Bike Box

% of motor vehicles arriving on red signal encroaching in the bike box



Location of Stopped Cyclist in Box



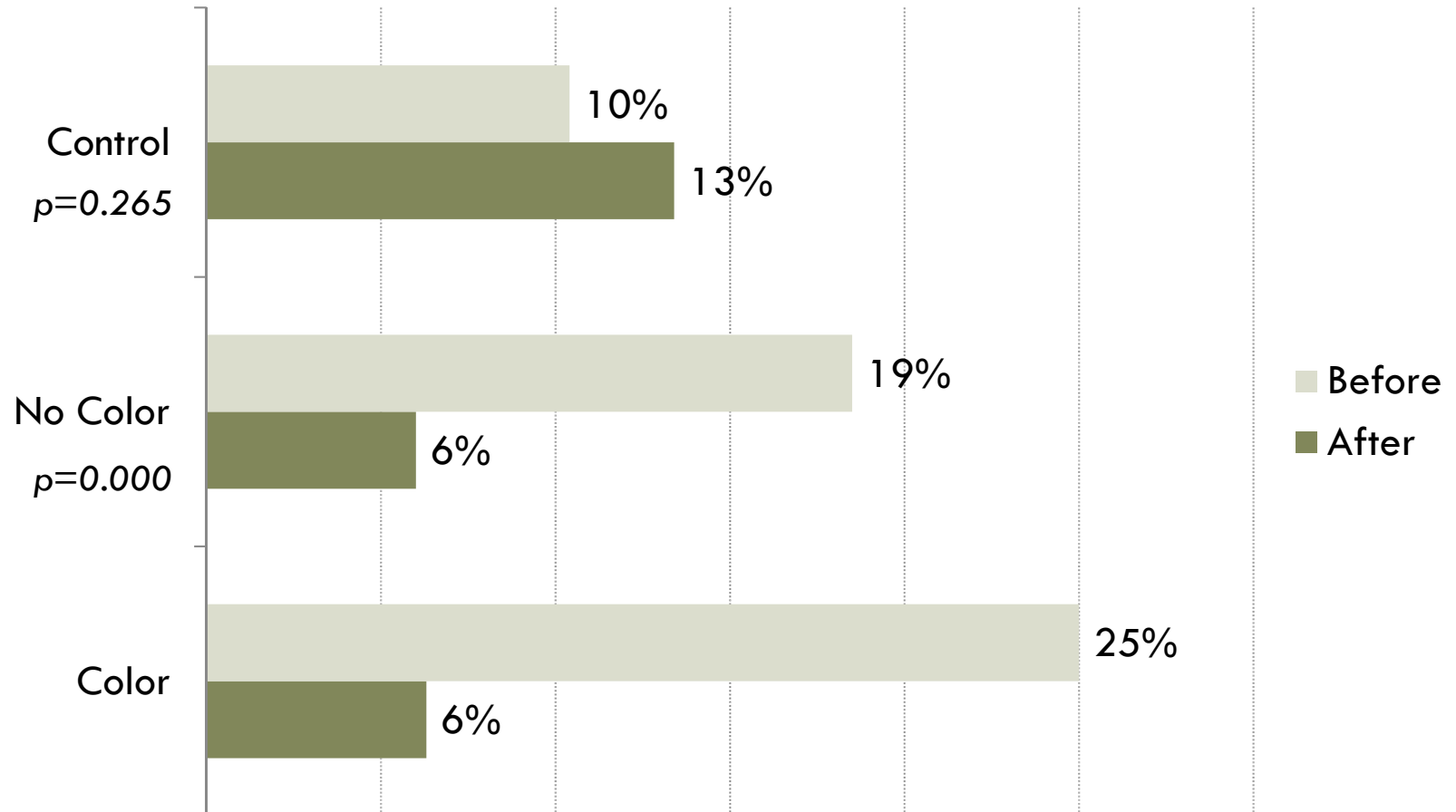
73% of cyclists stop *ahead* of motor vehicle (A or B), though only 9% *in front* (area A)

Are the markings improving safety?



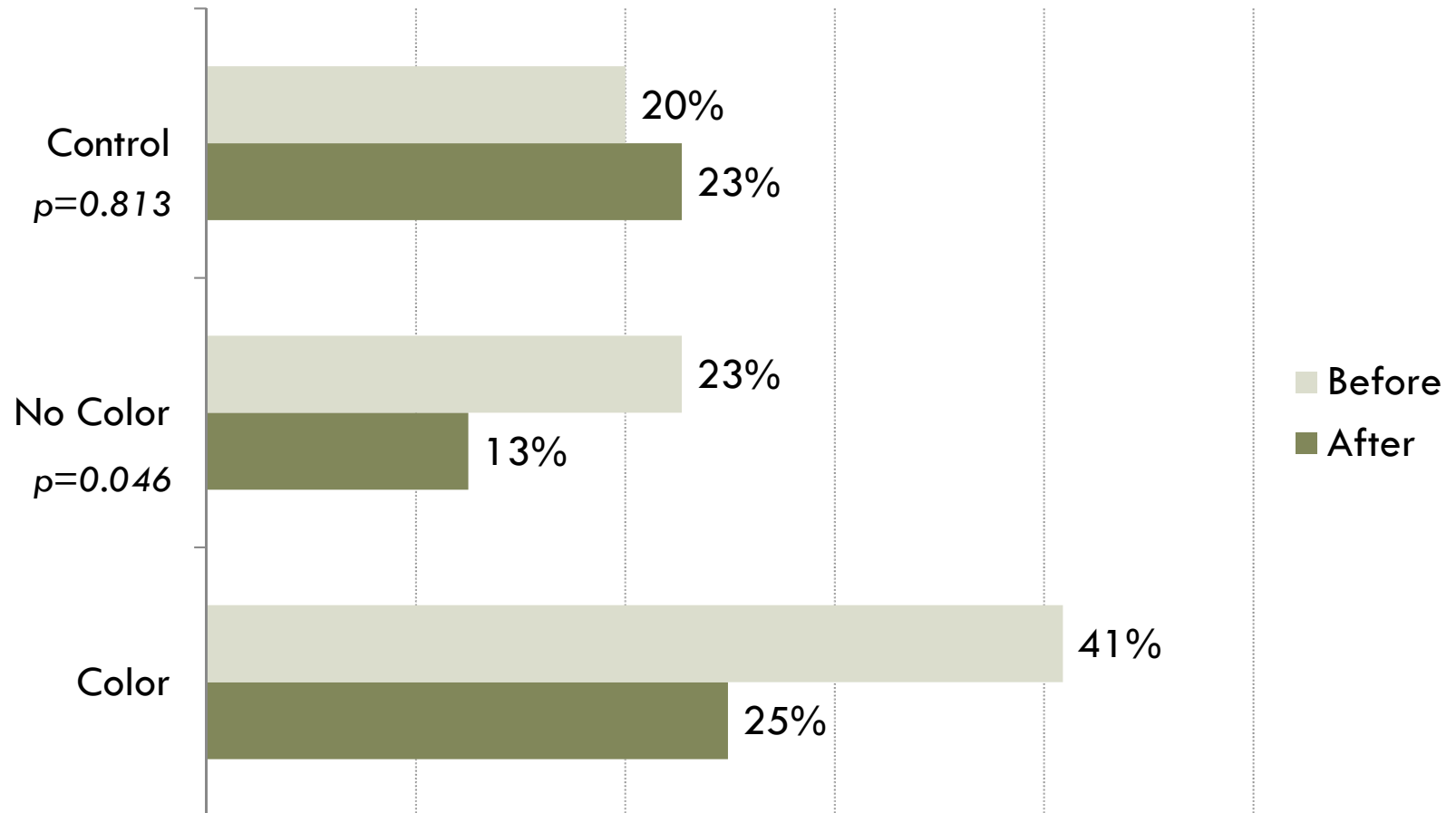
Motor Vehicle Encroachment in Crosswalk

% of motor vehicles arriving on red signal encroaching in the crosswalk

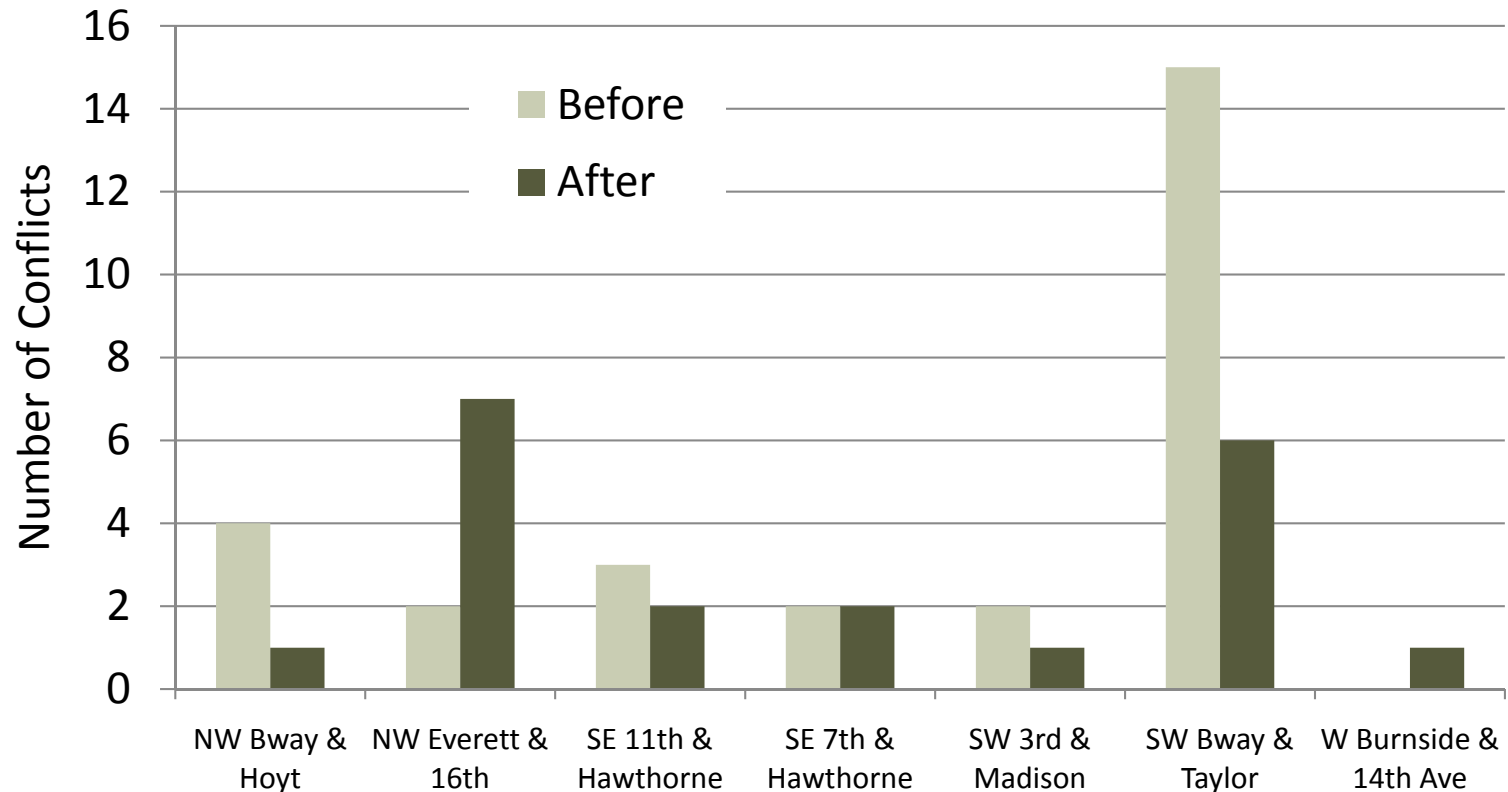


Cyclist Encroachment in Crosswalk

% of cyclists arriving on red signal encroaching in the crosswalk



Conflicts between motorists and cycles

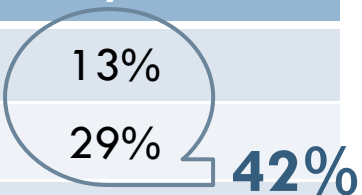


No conflicts before or after at three bike box intersections and both control intersections.

Motorist Survey

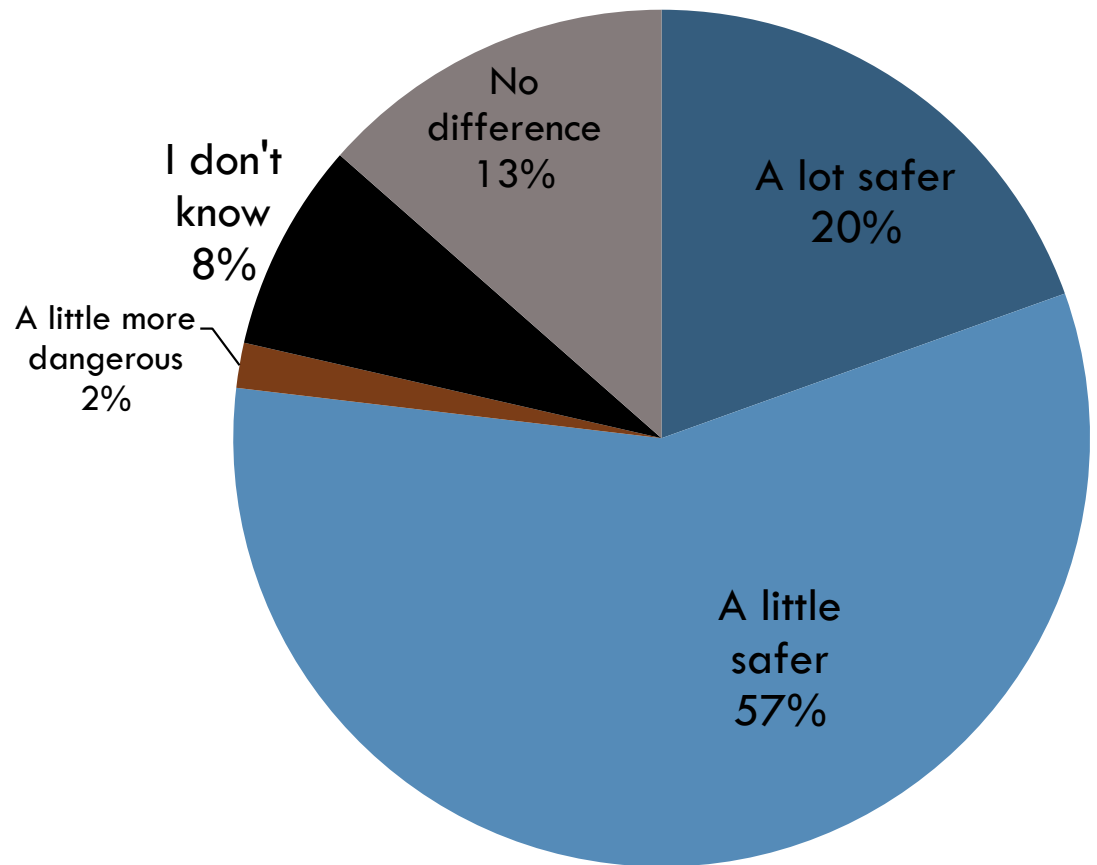
Do you think the bike box has made driving safer or more dangerous at the intersections?)

	All motorists	Motorists who are not cyclists
A lot safer	16%	13%
A little safer	36%	29%
No difference	18%	17%
A little more dangerous	9%	11%
A lot more dangerous	3%	4%
Don't know	18%	27%
n	717	219



Bicyclist Survey

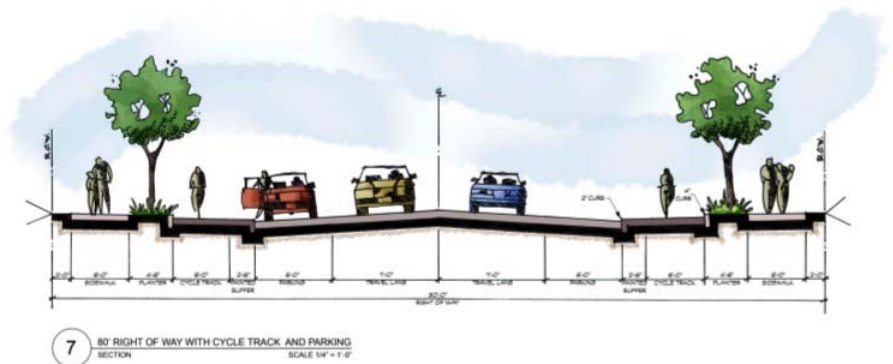
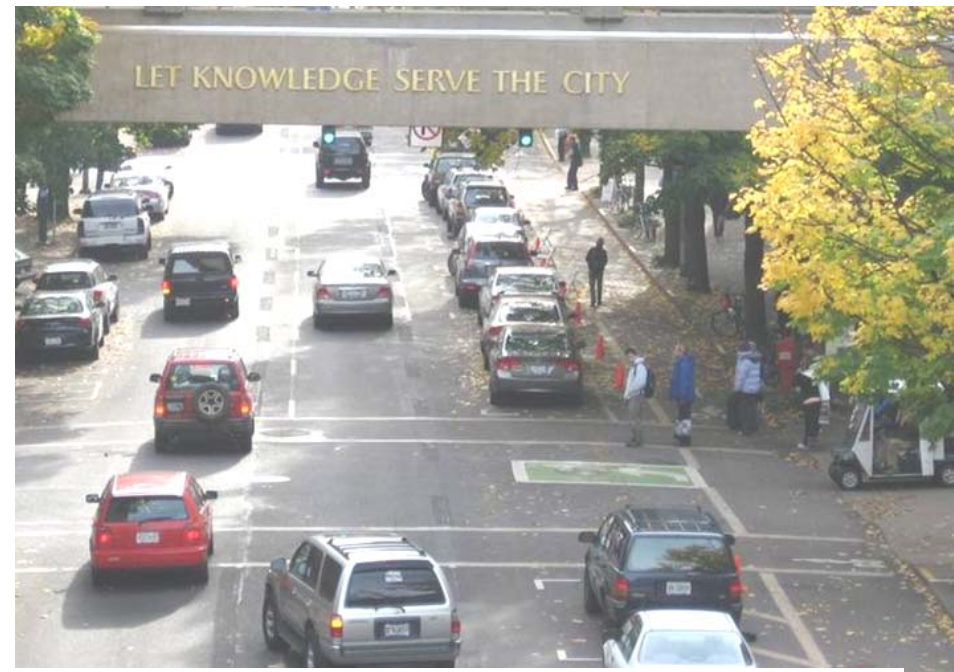
Do you think the bike box has made the intersection safer for you as a cyclist?



Conclusions

- Findings supporting boxes
 - ▣ Compliance and understanding is high
 - ▣ Pedestrians are benefitting from reduced crosswalk encroachment
 - ▣ Conflicts fell
 - ▣ Yielding behavior increased
 - ▣ Improved perceptions of safety
- Unclear findings
 - ▣ Increase in bike lane encroachment

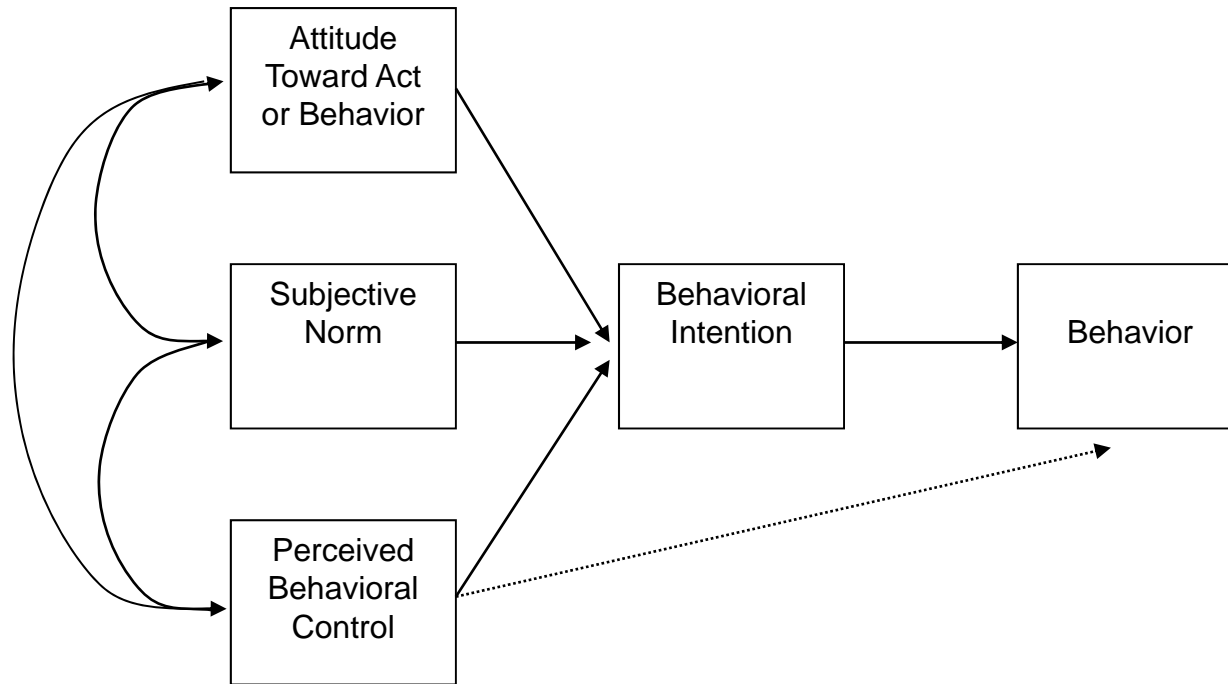
Next Up: CycleTracks





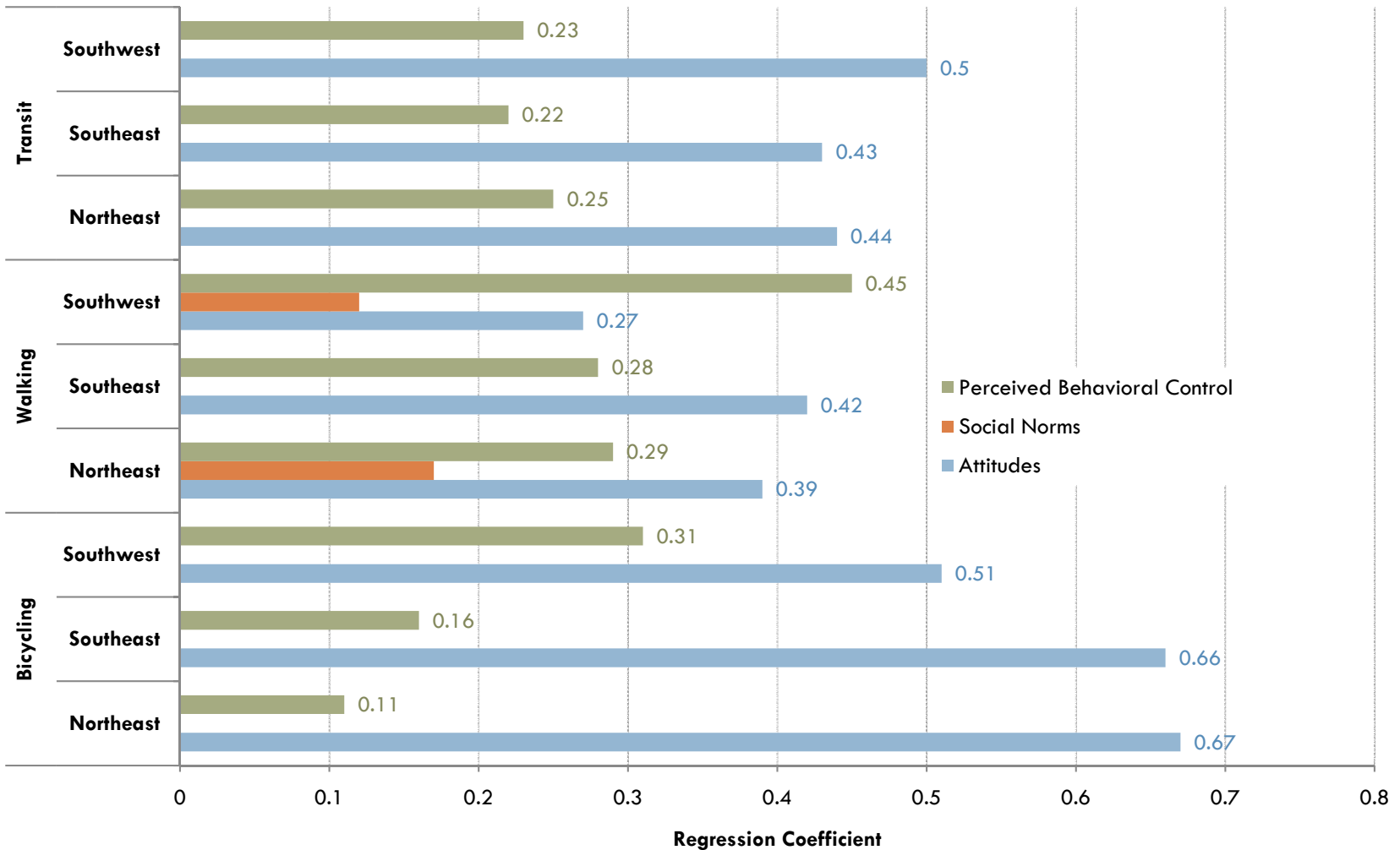
The Role of Psychology

Theory of Planned Behavior



Source: Ajzen 1991

Model Results





Conclusions & Questions

Contact information

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www.ibpi.usp.pdx.edu
- Oregon Transportation Research & Education Consortium
www.otrec.us